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MANUAL OF GYNECOLOGY.

MANUAL

OF

GYNECOLOGY.

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TO

OUR FRIEND AND TEACHER,

ALEXANDER RUSSELL SIMPSON,

M.D., F.R.S.E.,

PROFESSOR OF MIDWIFERY AND DISEASES OF WOMEN AND CHILDREN IN THE
UNIVERSITY OF EDINBURGH.

PREFACE TO FOURTH EDITION.

THIS Edition has been carefully revised and brought up to date, and New Sections on Massage and Apostoli's Method of Treatment have been added without materially increasing the size of the Work.

The Index of Gynecological Literature gives a convenient Bibliography of the important papers published since the last Edition.

We have to express our thanks to Mr J. A. Melville, not only for his literary help and the work connected with the Indexes, but also for the preparation of the technical portion of the Section on Apostoli's Method.

To Mr J. C. Webster, M.B., we are also greatly indebted for valuable help afforded in preparing this Edition for press.

D. BERRY HART.
A. H. FREELAND BARBOUR.

EDINBURGH, Feb. 1, 1890.

PREFACE TO FIRST EDITION.

IN writing this Manual we have tried to keep before our eyes the great principle that the Anatomy, Physiology, and Pathology of the Pelvic Organs form the foundation of good Clinical work. As students we felt the want of a text-book based on this principle and embodying the most recent views from the various literatures instead of giving those of one school. This want we have endeavoured to supply.

Our thanks are due to Professor Simpson for his kind advice in matters of difficulty: and specially to Mr J. A. Melville, for the literary revision of the text and the preparation of the copious Table of Contents and Indexes.

Messrs W. & A. K. Johnston have executed the lithographs with their well-known accuracy and finish: and to Mr James Bayne we are indebted for the care and fidelity with which he has drawn on the wood the majority of the engravings. We have in all cases acknowledged the source of every illustration not specially prepared for this work.

D. BERRY HART.
A. H. FREELAND BARBOUR.

EDINBURGH, July, 1882.

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PART I.

ANATOMY, PHYSIOLOGY, AND METHODS OF EXAMINATION OF THE FEMALE PELVIC ORGANS.

Section I. Anatomy and Physiology of the Female Pelvic Organs.
,, II. Physical Examination of the Female Pelvic Organs.

SECTION I.

ANATOMY AND PHYSIOLOGY OF THE FEMALE PELVIC ORGANS.

IN order to give a comprehensive idea of the Anatomy and Physiology of the Female Pelvic Organs, it will be advisable to consider them in the following manner.

Chapter I. General Anatomy of External Genitals and Contents of Pelvis.

Chapter II. The Sectional Anatomy of the Female Pelvis.

Chapter III. The position of the Uterus and its Annexa, and the relation of the Superjacent Viscera.

Chapter IV. The Structural Anatomy of the Pelvic Floor; Pelvic-Floor Projection.

Chapter V. The Blood-vessels, Lymphatics, and Nerves of the Pelvis. Development of Pelvic Organs.

Chapter VI. Physics of the Abdomen and Pelvis, with special reference to the Semiprone and Genupectoral Postures.

Chapter VII. Ovulation and Menstruation.

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CHAPTER I.

GENERAL ANATOMY OF EXTERNAL GENITALS AND CONTENTS OF PELVIS.

LITERATURE.

External Genitals. *Ballantyne*—The Labia Minora and Hymen : Edin. Med. Jour., Nov. 1888, p. 425. *Budin*—Recherches sur l'hymen et l'orifice vaginal : Paris, 1881. *Carrard*—Beitrag zur Anatomie und Pathologie der Kleinen Labien : Ztschrift für Geburtshülfe and Gynäkologie, Bd. X., Hft. 1. *Matthews Duncan*—Papers on the Female Perineum : Churchill, London, 1880. *F. P. Foster*—A Contribution to the Topographical Anatomy of the Uterus and its Surroundings : Am. J. of Obst., Vol. XIII., p. 30. *Garrigues*—The Obstetric Treatment of the Perineum : Am. J. of Obst., Vol. XIII., p. 231. *Hart, D. Berry*—Note on the Naked-eye Anatomy of the Female External Genitals : Ed. Med. Jour., 1882. Atlas of Female Pelvic Anatomy, Edinburgh, 1884. *Henle*—Handbuch der Eingeweidelehre des Menschen : Braunschweig, 1866. *Klein*—The External Genitals of the Male and Female, by E. Klein : Stricker's Manual of Human and Comparative Histology, Vol. II. (Syd. Soc. Tr., 1872). *Klein and Smith*—Atlas of Histology : Smith, Elder, & Co. London, 1880. *Sutton*—On the Nature of the Hymen : Brit. Gyn. Jour., 1888.

Muscles of Pelvic Floor. *Cunningham*—The Dissector's Guide ; Abdomen : Maclachlan & Stewart, Edinburgh, 1880. *Doran*—A Dissection of the Muscles of the Female Pelvis and Perineum : Lond. Obst. Tr., 1886, 274. *Henle*—op. cit. *Luschka*—Die Musculatur am Boden des weiblichen Beckens : Wien, 1861. *Savage*—Female Pelvic Organs, 2d Edition : London, 1870. *Turner*—An Introduction to Human Anatomy : A. & C. Black.

Uterus, and Annexa ; Organ of Rosenmüller and Gartner's Canals ; Vagina. *Barnes*—The Diseases of Women ; London, 1878. *Breisky*—Die Krankheiten der Vagina : Billroth's Handbuch, Stuttgart, 1879. *Coe*—The Anatomy of the Female Pelvic Organs : Amer. Syst. of Gynecology, Vol. I., p. 95. *Cruveilhier*—Traité d'Anatomie Descriptive : Paris, 1871. *Engelmann*—The Mucous Membrane of the Uterus : Am. J. of Obst., Vol. VIII., p. 30. *Farre*—The Uterus and its Appendages : Todd's Cyclopædia, Vol. V. *Hart*—Structural Anatomy of Female Pelvic Floor : Maclachlan & Stewart, 1880. *Henle* — op. cit. *Hennig* — Der Katarrh der inneren weiblichen Geschlechtstheile : Leipzig, 1862. *Küstner*—Das untere Uterinsegment und die Decidua cervicalis : Jena, 1882. *Mundé*—Prolapse of the Ovaries : American Gynecological Transactions, Vol. IV., 1879. *Rainey*—On the Structure and Use of the Ligamentum Rotundum Uteri : Lond. Phil. Tr., 1880, p. 515. *Rieder*—Ueber die Gartner'schen (Wolff'schen) Kanäle beim menschlichen Weibe : Virch. Archiv. Bd. 96. (This paper gives literature and references to papers by Gartner, Dohrn, Freund, and others.) *Ruge and Veit*—Zur Pathologie der Vaginal Portion : Stuttgart, 1878. *Sappey*—Traité d'Anatomie Descriptive : Paris, 1873. *Schroeder*—Handbuch der Krankheiten der weiblichen Geschlechtsorgane : Leipzig, 1879. *Taylor*—Gastro-Hysterectomy, or the Recent Modification of the Cæsarean Section, by Dr Porro : American Journal of Medical Science, Vol. LXXX., p. 115. *Turner*—op. cit.

Bladder. *H. J. Garrigues*—Remarks on Gastro-Elytrotomy : Am. Gynecol. Tr., Vol. III., p. 212. *Polk, W. M.*—Landmarks in the Operation of Laparo-Elytrotomy : N. Y. Med. Jour., May 1882. *Skene*—Diseases of the Bladder and Urethra : New York, 1870. The Anatomy and Pathology of Two Important Glands in the Female

Urethra: Am. J. of Obst., Vol. XIII. *Winckel*—Die Krankheiten der weiblichen Harnröhre und Blase: Billroth's Handbuch, Stuttgart, 1877.

RECTUM. *Braune*—Topographisch-anatomischer Atlas, Zweite Auflage: Leipzig, Veit and Co., 1872. *Chadwick*—The Function of the Anal Sphincters so-called: Am. Gyn. Tr., Vol. II., p. 43. *Hart*—Physics of Rectum and Bladder: Edin. Med. Jour., 1882. *Otis*—Anatomical Researches on the Human Rectum: Leipzig, 1887. *Pirogoff*—Anatome Topographica etc. sectionibus per corpus humanum congelatum: Petropoli, 1859. *Ruedinger*—Topographisch-chirurgische Anatomie des Menschen: IV. Abtheilung. *Symington*—Rectum and Anus: Jour. of Anat. and Phys., XXIII.

PERINEAL BODY—*Hart*, *Henle*, *Savage*, op. cit. *Ranney*—The Female Perineum: New York Med. Jour., Vol. XXXVI., Nos. 1 and 2. *T. G. Thomas*—The Female Perineum; its Anatomy, Physiology, and Pathology: Am. J. of Obst., Vol. XIII., p. 312.

PERITONEUM AND CELLULAR TISSUE. *Bandl*—Die Krankheiten der Tuben, der Ligamente, und des Beckenperitonäums: Stuttgart, 1879. *Barnes*—St. George's Hospital Reports, Vol. VII., p. 57. *Freund*—Anatomische Lehrmittel zur Gynäkologie: Beiträge zur Geburtshülfe und Gynäkologie. Herausgegeben von der Gesellschaft für Geburtshülfe in Berlin, IV. Band, 1 Heft. S. 58. *Guérin*—Sur la Structure des Ligaments Larges: Comptes Rendus, 1879, 1364. *Le Bec*—Contribution a l'étude des Ligaments Larges (au point de vue de l'anatomie et de la pathologie): Gaz. Hebd., 15 Avril 1881. *Von Preuschen*—Ueber Cystenbildung in der Vagina: Virchow Archiv. Bd. 70. *De Sinéty*—Gynécologie: Paris, 1880. *Spiegelberg*—Remarks upon Exudations in the neighbourhood of the Female Genital Canals: German Clinical Lectures (New Syd. Soc. Tr.), p. 169. *Braune*, *Cunningham*, *Hart*, *Pirogoff*, op. cit.

EXTERNAL GENITALS AS OBSERVED CLINICALLY.

External Genitals.

UNDER the term external genitals are comprised the structures known as Labia Majora, Fourchette, Labia Minora, Clitoris with its prepuce, Vestibule, and Fossa Navicularis. For clinical convenience the urethral orifice and hymen also are described with these; although the urethral orifice belongs to the urinary system, and the hymen separates anatomically the external genitals (vulva) from the vagina.

Labia Majora.

The *Labia Majora* (fig. 1, *a*) are two thick folds of hair-clad skin, extending from the symphysis pubis backwards between the thighs, and meeting each other nearly in the middle line and about 2.7 cm. (1 inch) in front of the anus; their blunted posterior ends can be seen most distinctly in the fœtus. Each labium has an outer and inner surface, and consists of a thick fold of skin enclosing a quantity of fat, blood-vessels, and dartos. Superiorly, where they are best developed, they form by their junction—anterior commissure—the structure known as the mons veneris (*vide* Plate IV.); while posteriorly they are a mere fold of skin known as the *Fourchette* or posterior commissure. The fat and connective tissue are almost entirely wanting at the fourchette, which is not a distinct structure but may be the posterior junction of the thinned-out labia minora or labia majora. Both labia majora are, in the adult, covered with crisp hair which is abundant over the mons veneris and outer surface but very much less so on the inner.

Labia Minora.

The *Labia Minora* (fig. 1, *b*) are two small oblique folds of skin, one on the inner surface of each labium majus. Posteriorly each blends insensibly with the labium majus at about its middle, while anteriorly they converge and each divides into two small branches—an upper and a lower. The upper branches meet to form the prepuce of the clitoris (fig. 1, *e*), while the lower in a similar way form its suspensory ligament. As a rule the labia minora do not, in the adult, project beyond the labia majora. Sebaceous glands are present on both labia. Microscopically the labia minora have the structure of skin and Carrard has found in them Meissner's corpuscles which are nerve end-organs found only in the papillæ of skin. As above stated, the labia minora may be continued into the fourchette.

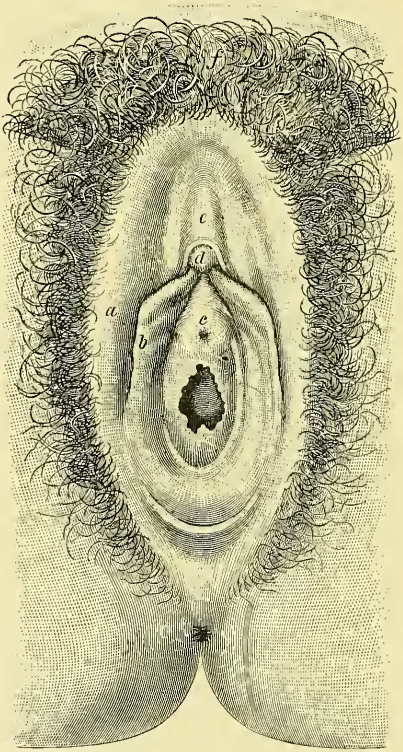

FIG. 1.

EXTERNAL GENITALS OF VIRGIN, with Diaphragmatic Hymen. The Labia Majora and Minora are drawn apart, and the prepuce drawn back. The cadaver is in the lithotomy posture. (Modified from *Sappey*.)
a Labium majus; *b* Labium minus; *c* Vestibule just above urethral orifice; *d* Glans clitoridis; *e* Praeputium clitoridis; *f* Mons Veneris. ($\frac{1}{1}$)

litoris. The *Clitoris*, covered by its prepuce, lies in the middle line and at the apex of the smooth piece of mucous membrane known as the vestibule. Only that part analogous to the glans penis is seen (fig. 1, *d*). The clitoris proper consists of two crura which arise from the rami of the ischium and pubes and unite superiorly to form the body of the clitoris, which lies beneath the mucous membrane. The glans clitoridis is not directly continuous with the body, but joins it through the pars intermedia of the bulb (*vide post*, p. 10).

Vestibule.

The *Vestibule* (fig. 1, *c*) is a triangular smooth mucous surface bounded superiorly by the clitoris, laterally by the labia minora, and inferiorly by the upper margin of the vaginal orifice. In the middle line, at its base, the dimple of the urethral orifice can be distinctly felt 1 inch (2—2.5 cm.) in front of the fourchette. Small depressions and mucous glands open on its surface.

Vaginal Orifice.

The *Vaginal Orifice* lies in the middle line between the base of the vestibule and the fossa navicularis. Its orifice is guarded by the *hymen*, a thin fold of mucous membrane enclosing some connective tissue, blood-vessels, and nerves (?). The hymen may be crescentic in shape, attached to the posterior margin of the vaginal orifice and with a free edge towards the base of the vestibule (figs. 2 and 5); or diaphragmatic, attached all round the vaginal orifice but with a small hole (figs. 1 and 4) or vertical slit (fig. 3) in it. Sometimes it is not so perforated, constituting a pathological condition.

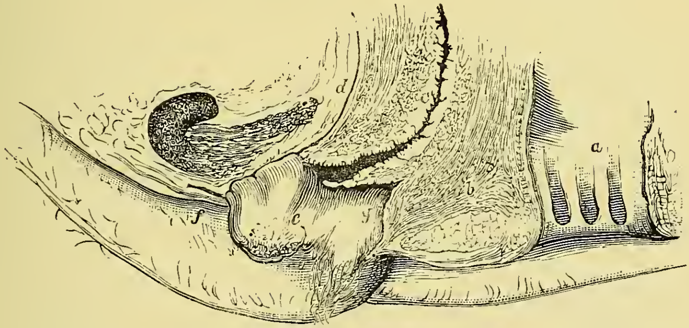

Fig. 2.

Vertical Mesial Section of External Genitals (*Henle*).

a Anus ; *b* Perineal body ; *c* Vagina ; *d* Urethra ; *e* Labium Minus ; *f* Prepuce of Clitoris ; *g* Fossa Navicularis, with Hymen in front and Fourchette behind. ($\frac{1}{1}$)

The point as to whether the Hymen belongs developmentally to the external genitals or vagina is disputed. Budin believes that the hymen is simply the thinned-out inferior margins of the anterior and posterior vaginal walls. One specimen we have examined certainly supports his statement that the vaginal columns run on the inner aspect of the hymen. Matthews Duncan has pointed out the interesting fact that in atresia vaginæ the hymen may be present, *i.e.* may be present although the vaginal walls are absent. More recently Pozzi has described cases of mal-development of the sexual organs, and brought out some interesting facts. One case was that of a male hypospadiac with external genitals simulating a female type, *i.e.* with a pseudo-vulva, a distinct hymen, and a fourchette. Pozzi found a ridge passing from the base of the glans penis, encircling the meatus urinarius and becoming continuous with the hymen : this he terms the male vestibular band. In a female with atresia vaginæ he found a similar band passing from the clitoris, surrounding the urethral orifice, and blending with the hymen. He advances the view that the hymen is vulvar in its origin and alleges that in women the "male vestibular band" can be seen on careful examination. In the hypospadiac already described this band was the remnant of the *corpus spongiosum*, so that he believes the hymen to be the analogue of the bulb in man.

Recent papers by Ballantyne and Sutton support the view that the hymen is vulvar in its origin. Ballantyne has also confirmed Pozzi's view.

ossa
avicu-
aris.

Fossa Navicularis.—Normally, the inner aspect of the fourchette is in contact with the outer and lower surface of the hymen. When the fourchette is pulled back by the finger, a boat-shaped cavity is made—the fossa navicularis. Its posterior boundary is, therefore, the inner aspect of the fourchette; its anterior is the posterior aspect of the hymen. These two are in contact unless artificially separated (fig. 2).

From behind forwards, in the female ano-vulvar region there lie in the middle line the following structures.

(1.) Anus.
(2.) Skin over base of Perineal Body.
(3.) Fourchette.
(4.) Fossa Navicularis.
(5.) Vaginal orifice, with Hymen or its remains.
(6.) Urethral orifice.
(7.) Vestibule.
(8.) Clitoris with its prepuce.

Laterally, we have the labia majora and minora.

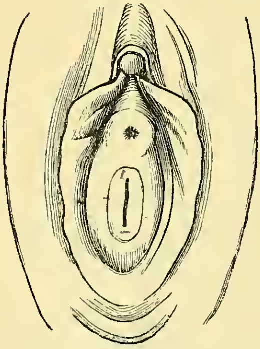

Fig. 3.

Hymen of Virgin, with Vertical Slit. ($\frac{1}{1}$)

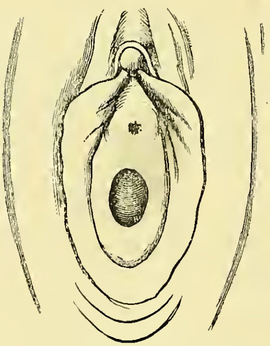

Fig. 4.

Hymen with Oval Opening. ($\frac{1}{1}$)

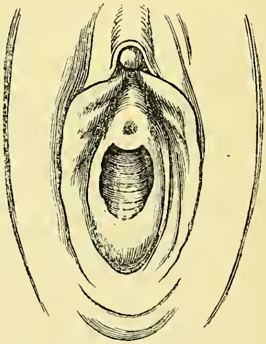

Fig. 5.

Crescentic Hymen. ($\frac{1}{1}$)

The following points should be carefully noted. In the nude erect female only the mons veneris is seen, and the labia majora and minora lie in a plane nearly parallel to the horizon. The well-developed labia majora have their inner surfaces always in contact, and are only slightly separated by the widest divergence of the knees. The labia minora are always in contact, and require to be artificially separated in order to see their inner surfaces. The fossa navicularis only exists when artificially opened up. Therefore, to see the external genitals fully, the labia must be separated and the prepuce drawn back.

A line running as follows separates mucous membrane from skin. Starting from the base of the inner aspect of the right labium minus, it passes *down* beside the base of the outer aspect of the hymen, *up* along the base of the inner aspect of the left labium minus, *in* beneath the prepuce of the clitoris, and *down* to where it first started from.

The vulvar slit is sagittal, and lies in the middle line between the labia majora and minora.

Hymen.

The vaginal orifice is transverse, only exists when artificially made, and is anatomically defined by the hymen which separates the external genitals from the internal genitals. The sharp line between skin and mucous membrane can be distinctly seen on the living subject. The labia minora are skin, thin and fine, and not mucous membrane as often alleged.

The following measurements by Foster are useful for reference :—

	Tip of Coccyx to Anus.	Anus to Fourchette.
Average distance in nulliparæ, . .	4·5 cm. . .	2·7 cm.
,, ,, multiparæ, . .	4·7 cm. . .	2·5 cm.

Meatus urinarius, 2—2·5 cm. from fourchette, in nulliparæ; 2—3·1 cm., in women who have borne children.

The virginal vaginal orifice should have the appearances shown at figs. 1, 3, 4, and 5, and the free edge of the hymen should be intact.

In a healthy woman who has experienced complete coitus, the hymen is torn or often only stretched. It admits two fingers without pain. In a woman who has borne full-time children, the vaginal orifice is always torn, although the fourchette and all behind it may be intact. The carunculæ myrtiformes are probably the remains of the hymen. In addition, the passage of the child's head may cause tears of the posterior vaginal wall, perineal body, or even anterior wall of anus.

THE PELVIC FLOOR AND ORGANS RESTING ON IT CONSIDERED AS A WHOLE.

The outlet of the bony female pelvis is filled in by what is generally described as the 'soft parts.' This term, however, should not be employed, as it is misleading, especially in scientific obstetrics. It is better named the pelvic floor or pelvic diaphragm.

Pelvic Floor.

The pelvic floor is a thick fleshy elastic layer, dovetailed all round to the bony pelvic outlet (fig. 6). It may be considered as an irregularly-edged segment of a hollow sphere, with an outer *skin* aspect and an inner *peritoneal* one. On the outer skin aspect lie the external genitals already described. On the inner peritoneal surface we have the organ known as the uterus, and its appendages the Fallopian tubes and ovaries. The vagina runs, in the erect female, at an angle of about 60° to the horizon from the vaginal orifice upwards to the mouth of the womb, as a transverse slit in the pelvic diaphragm. In front of the vagina lies the bladder, while behind it the rectum is placed; these structures, along with muscles, connective tissue, blood-vessels, nerves, and lymphatics, making up the pelvic diaphragm.

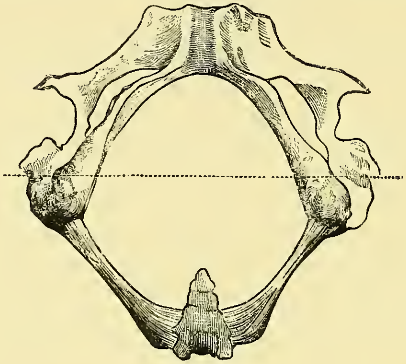

FIG. 6.
BONY PELVIC OUTLET, with transverse line showing Rectal and Urethral Triangles (*D. J. Cunningham*). (¼)

Figure 1 shows, accordingly, the pelvic floor seen from its convex, skin aspect; fig. 50 gives it and the organs resting on it as viewed from its concave, peritoneal side; while fig. 32 displays it as seen in sagittal mesial section.

THE PELVIS CONSIDERED IN DETAIL.

PELVIC FLOOR DISSECTED FROM BELOW.

If a female cadaver be placed in the lithotomy posture and a transverse line drawn just in front of the ischial tuberosities, the perineal region will be divided into a posterior rectal triangle and an anterior urethral one (fig. 6). The former contains the anus, the latter the external genitals.

The fascia of the pelvic floor and its relations demand a few words here.

(1.) *The superficial fascia.*
(2.) *The deep layer of the superficial fascia.*
(3.) *The triangular ligament in two layers.*

(1.) *The superficial fascia* lies beneath the skin, and is simply the continuation over the pelvic floor of the general superficial fascia of the body.

(2.) *The deep layer of the superficial fascia* has the following attachments:—Laterally and above, it is joined to the pubic arch; while posteriorly it passes round the transverse perineal muscles to join the base of the anterior layer of the triangular ligament. If air be injected beneath this deep layer, its passage is limited by the attachments given, and a sac is made—the pudendal sac. Into this sac an inguinal hernia may push its way, and in it the round ligaments of the uterus end.

(3.) *The triangular ligament* consists of two layers of fascia, filling in the pubic arch. They are termed anterior and posterior. The following table may be omitted at present, until the whole anatomy is mastered.

Between skin and superficial fascia.	Supfl. hæmorrhoidal vessels and nerves. Supfl. perineal artery and nerve.
Between deep layer of superficial fascia and anterior layer of triangular ligament.	Transversus perinei. Bulbo-cavernosus. Erector clitoridis. Transverse perineal blood-vessels and nerves. Venous plexuses. Bulbs of vagina. Pudendal sacs. Dorsal artery and vein of clitoris.
Between the layers of the triangular ligament. (v. also p. 11.)	Compressor urethræ. Vagina—in part. Urethra—in part. Pudic vessels and nerves.

Ischiorectal Fossa.

By suitable incisions the skin and superficial fascia can be removed around the anus, and the ischiorectal fossa defined. This is a small

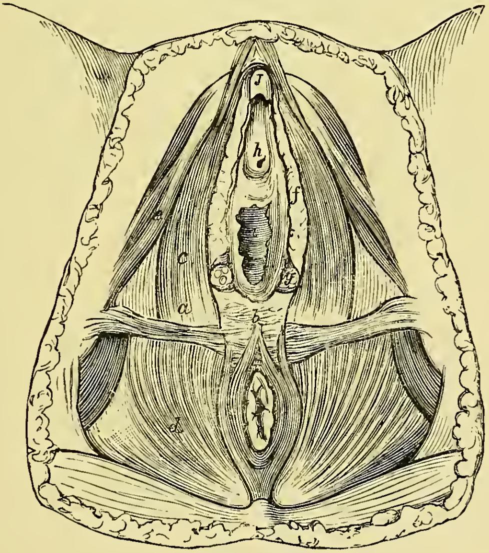

Fig. 7.

Dissection of Perineal Region (*Savage*).

a is just above Transversus Perinei; *b* Base of Perineal body; *c* Bulbo-cavernosus; *d* lies on Levator Ani and in Ischiorectal Fossa; *e* Erector Clitoridis; *f* Bulb of Vagina; *g* Bartholinian Gland; *h* Vestibule; *j* Glans Clitoridis. (½)

pyramidal cavity on each side of the rectum, bounded externally by the obturator internus muscle, internally by the levator ani. Its apex is formed by the junction of these muscles, while its base is partially closed in by the transversus perinei and the edge of the gluteus maximus muscle (fig. 7). If axial-transverse sections of the fossa be made (Pl. II. fig. 2, and Pl. III. fig. 2), we see that it is merely the passage of the subcutaneous fat between the gluteus maximus, levator ani, and obturator internus muscles. The gluteus maximus forms the posterior and inferior boundary.

On transverse sections from before backwards it can be noted that its boundaries vary. At the level of the ischial tuberosity it is bounded as follows : inside, levator ani ; outside, lower half of obturator internus ; while the gluteus floors it in incompletely. About an inch posterior to the tuberosity, we find the boundaries change as follows : inside, we have still the levator ani ; outside, a small portion of the obturator internus ; while the gluteus maximus floors it in completely. At the posterior margin of the fossa, the levator ani is the inner and upper boundary, the gluteus maximus the outer and lower, the fossa here being quite below the level of the obturator internus. If the skin and superficial fascia be now removed from the urethral triangle, the following muscles, etc., will be exposed (fig. 7).

Iuscles
eneath
uperficial
scia (deep
yer).

Perineal muscles.—On each side of the vaginal orifice three muscles lie, viz., the bulbo-cavernosus (fig. 8, *b c*), erector clitoridis or ischio-cavernosus (fig. 8, *e c*), and transversus perinei (fig. 8, *t p*).

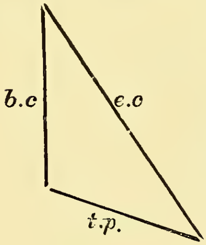

Fig. 8.

The *Bulbo-cavernosi* consist of two muscular slips, one on each side of the vaginal orifice, which spring behind from the perineal body and pass round the vaginal orifice, partially covering the bulb and the vagina (fig. 7, *c*). The anterior end of each slip splits into three portions which end as follows :—One passes to the under surface of the corpus cavernosum of the clitoris, a second goes to the posterior surface of the bulb, and a third blends with the mucous membrane between the clitoris and urethral orifice (*Henle*, *v.* fig. 9).

The *Erector Clitoridis* arises from the inside of the ischial tuberosity and is inserted into the back and sides of the crus clitoridis (fig. 9, *e*).

The *Transversus Perinei* arises from the ramus of the ischium, and passes to the perineal body. It is difficult to define practically in dissection (fig. 7, *a*).

Now that these muscles have been described, we are in a position to localise more important structures.

ulbi
aginæ.

The *Bulbi Vaginæ* (corpora cavernosa urethræ) are small masses of erectile tissue about the size of a bean, lying one on each side of the vaginal orifice and partly under cover of the bulbo-cavernosus muscle. Each rests on the triangular ligament, and has internally the mucous membrane of the vagina ; while, as already said, they are partly covered by the bulbo-cavernosus muscle. Anteriorly each blends with its fellow, and this *pars intermedia* becomes continuous with the clitoris (fig. 7, *f*).

Bartholinian Glands.

The *Bartholinian Glands* lie one on each side of the vaginal orifice close to the posterior end of the bulb, and in front of the posterior layer of the triangular ligament (figs. 7, *g*, and 10, *e*). Each has a long duct opening at the sides of the hymen. Ranney asserts that these glands lie behind the posterior layer of the triangular ligament.

Perineal body.

Between the lower one-third of the posterior wall of the vagina and the anterior wall of the rectum, is an angular interspace (fig. 2, *b*) filled up by the structure known as the perineal body. This will be more fully described afterwards. At the present stage of the dissection only its base is seen, with the following muscles taking origin from or having an insertion into it,—sphincter ani, transversus perinei, bulbo-cavernosus, levator ani (fig. 7).

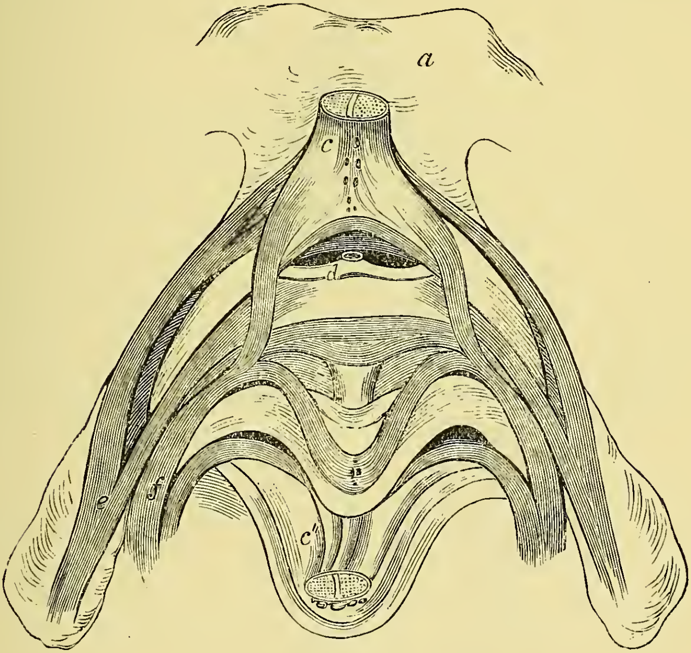

FIG. 9.

a Symphysis Pubis, showing muscles in connection with Clitoris and Bulb. The Clitoris, *c*, *c''*, is cut across near its point, and thrown down with the vestibulary mucous membrane (*Henle*). *e* Erector Clitoridis; *f* Bulbo-cavernosus with its three insertions; *d* Branch to Dorsal Vein of Clitoris. ($\frac{1}{1}$)

Between layers of triangular ligament.

Between the layers of the triangular ligament lie the urethra, a portion of the vagina, compressor urethræ, dorsal vein of the clitoris, internal pudic vessels and nerves, the artery to bulb, dorsal nerve of clitoris, and Bartholinian glands (*Cunningham*).

The dissection of the urethral triangle has now been considered until the bladder has been exposed as it lies behind the pubes, from which it is separated by a considerable amount of loose fatty tissue. In order to complete the consideration, we have now to take up the muscles not yet described, viz., levator ani, coccygeus and the obturator internus.

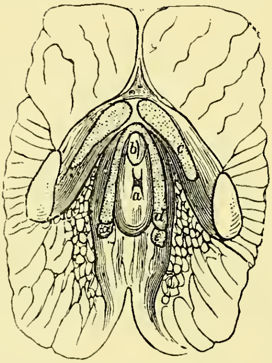

Fig. 10.

Oblique Section, parallel to the Anterior Pelvic Wall and through the External Genitals (*Henle*). *a* Vagina; *b* Urethra; *c* Corpus Cavernosum Clitoridis, covered by its Erector; *d* Bulbus Vaginæ covered by Bulbo-cavernosus Muscle; *e* Bartholinian Gland.

THE PELVIC FLOOR DISSECTED FROM ABOVE.

The pelvic floor must now be looked at from its internal concave or peritoneal aspect. If the peritoneum and connective tissue beneath it, with the nerves and blood-vessels, be removed on one side of the pelvis, say the right, the two muscles known as the coccygeus and levator ani will be exposed. These spring from the middle of the inner side of the true pelvis and, blending partly directly and partly indirectly with one another, form what may be termed the diaphragmatic muscles of the pelvic floor. If looked at through the pelvic brim, they are seen to form on both sides a concave arrangement analogous to the thoracic diaphragm (fig. 11).

Coccygeus.

The *Coccygeus* springs from the spine of the ischium and is inserted into the side of the lower part of the sacrum, and side and front of coccyx. There are two coccygei, one on each side (figs. 11 and 12).

Levator Ani.

The *Levator Ani* has an extensive origin. It springs in front from the back of the body and horizontal ramus of the pubes, from the pelvic fascia (white line) and the spine of the ischium. From this the muscle sweeps downwards and inwards to become attached in the middle line from before backwards as follows,—to the vagina, the rectum, its fellow of the opposite side, and finally to the tip of the coccyx (fig. 12). The pubic fibres blend "with the posterior half of the upper border of the sphincter vaginæ" (Doran).

The levator ani can act on the vagina, elevating it, and is also believed to aid the sphincter ani (*v.* Pl. II. and III.).

The *Obturator internus* has the following Origin: deep surface of obturator membrane except at its lowest part; fibrous arch completing canal for obturator vessels and nerves; and surface of true pelvis bounded above by iliopectineal eminence, posteriorly by great sciatic notch, inferiorly by ischial tuberosity (*vide* Pl. III.). Its relations are well shown in axial-transverse sections (*v.* Chap. II. and Pl. III.). In fig. 2, Pl. III., its inferior half bounds the ischiorectal fossa; its upper half, the bladder and levator ani. It can also be seen that it lies in relation to the broad ligaments, *i.e.* it bounds them where the peritoneal laminæ diverge.

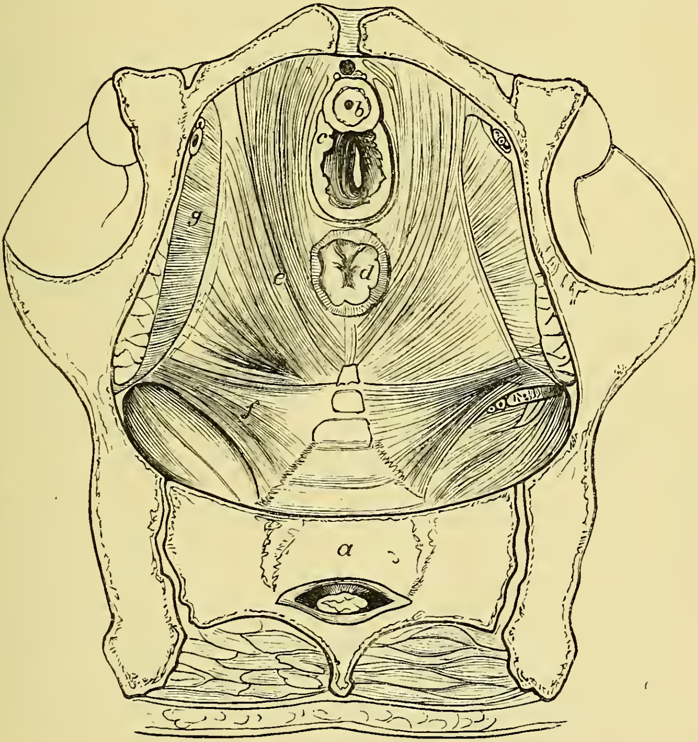

Fig. 11.

Dissection of Pelvis from above (*Savage*).

a Sacrum; *b* Urethra; *c* Vagina; *d* Rectum; *e* Levator Ani; *f* Coccygeus; *g* Obturator internus. (½)

We have now to take up the consideration of the generative organs. It is difficult to describe these without alluding to structures not fully considered until further on. The student may, therefore, not entirely grasp some of the points until the whole anatomy of the organs has been mastered.

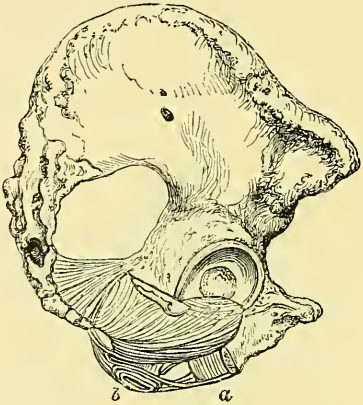

Fig. 12.
Levator Ani and Coccygeus seen from without, after removal of part of hip bone and clearing out of Ischiorectal Fossa (*Luschka*).
a Fibres of Levator Ani on Vagina ; *b* Anus, with Sphincter. (¼)

THE UTERUS AND ITS ANNEXA.

The Uterus. *The Uterus* is a triangular body, with a truncated apex downwards, placed between the bladder and rectum, and with the appearance seen at figs. 13 *A* and 14 *B*. In describing it we take up its external appearance, its nature on section, and its structure and relations.

Corpus Uteri. On external examination we find the parts known as the body (fig. 13, *A*, *c*), and neck (fig. 13, *A*, *a*, *b*). Keeping in mind its description as a triangle, we see the neck occupying the apex and the uterine orifices of the Fallopian tubes at the other two angles. Between the Fallopian tubes lies the fundus uteri. The anterior surface of the uterus is almost flat ; the posterior is convex at its upper part, as is well seen in fig. 13, *B*. Where the body passes into the cervix there is a slight depression noticed on the posterior surface. This corresponds to the isthmus.

Cavity of Uterus. On making a vertical mesial section, we observe that the uterus is a hollow organ possessing a cavity with the anterior and posterior walls in apposition (fig. 13, *B*). In order to see the cavity it is advisable to look at the uterus in coronal section, *i.e.*, a section which, passing through the cavity, divides the uterus into an anterior and a posterior half, as shown in fig. 13, *C*, fig. 14, *A*. This latter section enables us more fully to understand the division of the uterus into body proper and cervix, and the division of the uterine cavity into cavity of the body proper and cervical cavity.

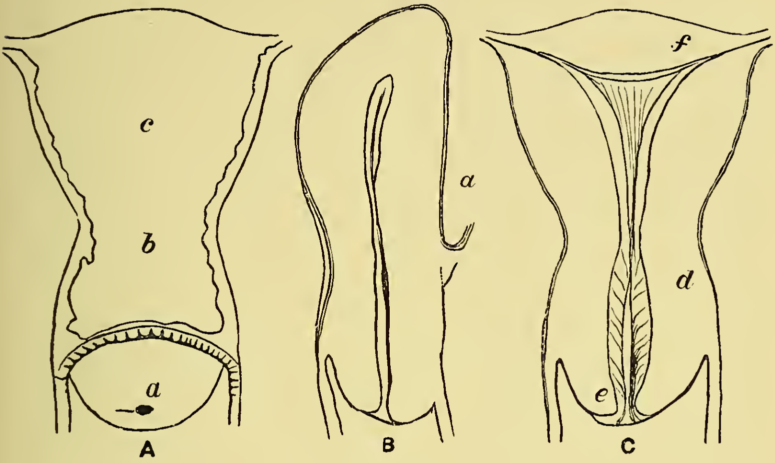

FIG. 13.

A. VIRGIN UTERUS (front view) (*Sappey*). The Appendages and Vagina are cut away. *a* Cervix (vaginal portion); *b* Isthmus; *c* Body; *a b* Cervix proper.

B. The SAME in vertical mesial section. *a* is anterior surface, and lies just above where peritoneum passes on to bladder.

C. The SAME with cavity exposed by coronal section. *e* Os Externum; *d* Os Internum; *f* Uterine Opening of Fallopian Tube. ($\frac{2}{3}$)

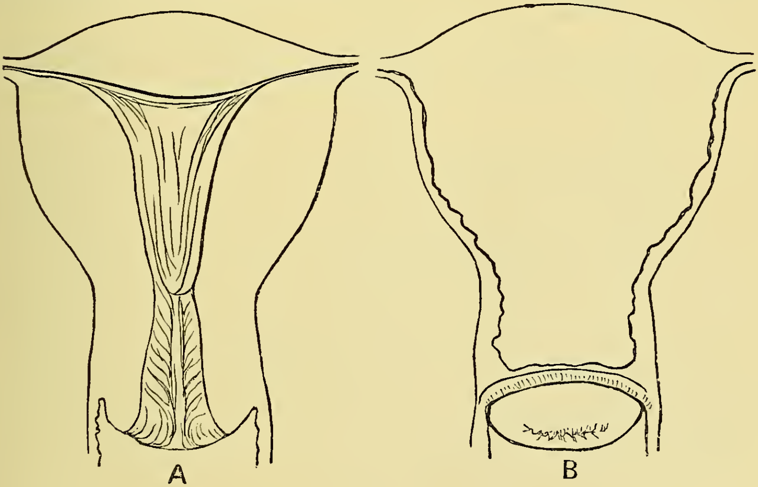

FIG. 14.

A. MULTIPAROUS UTERUS in coronal section to show cavity.

B. MULTIPAROUS UTERUS from front (*Sappey*). ($\frac{2}{3}$)

Cavity of Body.—This is a triangular slit in the uterus with the apex downwards, and with anterior and posterior walls. At each angle there is an opening, viz., at the lower angle we have the *os internum* opening into the cervical canal (fig. 13, *C*, *d*), and at the upper angle the uterine openings of the Fallopian tubes (fig. 13, *C*, *f*). The lining of the cavity is known as its mucous membrane.

Cavity of the Cervical Canal.—This is spindle-shaped or conical (fig. 13, *B*, *C*), and has two openings, viz., os internum above and os externum below. The former opens into the uterine cavity, the latter into the vagina.

Cervix uteri.

The Cervix is divided into two portions, the vaginal and the supra-vaginal. The vaginal portion is within the vagina, and appears as a conical mass of the size and shape seen at fig. 13, *A*, *a*. The os externum is in virgins a mere dimple, and feels to the examining finger like the tip of the nose. In women who have borne children it is transverse (fig. 14, *B*), and in most cases has its lips fissured more or less deeply, and the mucous membrane of the cervical canal partially everted. The supra-vaginal portion is continuous with the body through the isthmus.

The length of the whole unimpregnated uterus is, speaking generally, about 3 inches; the length of the cavity of cervix and body about 2½ inches.

Measurements with the sound on the living female are a little in excess of those obtained in sections on cadavera, owing probably to the sound's elongating the uterus somewhat.

	Virgin.	Nulliparæ.	Multiparæ.
Length of uterus . . .	2·35 in.	2·50 in.	2·70 in.
Width	1·50 ,,	1·55 ,,	1·70 ,,
Thickness	0·85 ,,	0·90 ,,	1·00 ,,
			Sappey.
Vertical diameter of cavity .	1·80 ,,		2·44 in.
Transverse ,, ,, .	0·60 ,,		1·24 ,,
			Richet.
Length of entire organ in young women			5-6 cm.
Do. body of uterus			3-3·5 ,,
Do. cervix			2-3 ,,
Do. vaginal portion of cervix			·55-·6 ,,
			Hennig.
Capacity of uterus in nulliparæ=2-3 c.cm. ; in multiparæ 3-5 c.cm.			*Sappey.*

Divisions of cervix uteri.

Various authors divide the cervix uteri more minutely as follows. They consider it as made up of—

a. a vaginal portion ;
b. an intermediate portion ;
c. a supravaginal portion. (Fig. 15.)

This view is of importance in relation to the seat and extent of the changes in the size of the uterus in prolapsus uteri.

Position of Os Internum.

The question as to the precise position of the os internum in the unimpregnated uterus is at present much disputed. Küstner, who has examined the point carefully, places the os internum at the narrow part where the lumen of the cervical canal becomes continuous with that of the uterine cavity proper. This part lies at the level of the isthmus uteri (*v.* fig. 16) and is also the point where the complicated uterine musculature passes into the simpler cervical muscular arrangement. The folds of the arbor vitæ sometimes cease at this point but may pass above it or in multiparæ may end below it.

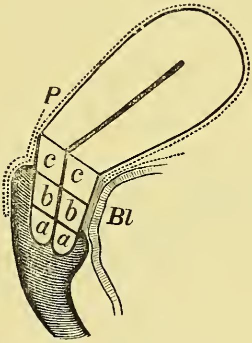

Fig. 15.

Diagram of Uterus to show divisions of Cervix (*Schroeder*).

a Vaginal portion ; *b* Intermediate portion ; *c* Supravaginal portion ; *Bl* Bladder *P* Peritoneum. The dotted line shows peritoneum.

Küstner also alleges that for $\frac{1}{2}$ cm. ($\frac{1}{5}$ in.) below the os internum as defined by him the cervical substance and mucous membrane are like that of the uterine body and that this special part of the cervical canal participated in the menstrual and pregnancy changes; and he therefore terms this the "inferior uterine segment," and speaks of a "cervical decidua." The os internum is believed by some to be at the level where the peritoneum passes on to the bladder.

Lower Uterine Segment.

While the two great divisions of the uterus are the *body* and *cervix*, it is of importance to keep in mind that in pregnancy we distinguish a special part of the body as the Lower Uterine Segment. It has the following characteristics: that the peritoneum is loosely attached over it, the muscular wall thinner there and the muscular bundles more separable; further, it plays in labour a passive rôle, and comes to be marked off from the part above by a thickening in the wall known as the contraction or retraction ring. We may show the relations of all the divisions in the following scheme :—

Body .	(*in pregnancy*)	Upper Portion. Lower Uterine Segment.
Cervix .	. . .	supra-vaginal portion. intermediate ,, vaginal ,,

Küstner, as we have seen, speaks of the inferior uterine segment as cervical in origin.

Structure of Uterus.

Structure of the Uterus.—If the uterus be viewed in vertical mesial section, it will be seen to be made up of three distinct elements, viz., peritoneum, unstriped muscular fibre, and mucous membrane (fig. 13, *B.*). The peritoneum covers, partially, its external surface; the mucous membrane lines the cavity of the body and cervix; while the muscular fibre, by far the largest constituent, forms the tissue lying between these.

Peritoneum of Uterus.

The Peritoneum of the Uterus clothes its posterior surface (except the vaginal and middle portions of the cervix), but only dips down on the front surface as far as the isthmus, at which level it is reflected on to the bladder (fig. 13, *B*, *a*). At the sides of the uterus the peritoneum on the anterior and posterior surfaces runs out to the wall of the pelvis, thus forming the important structures known as the broad ligaments.

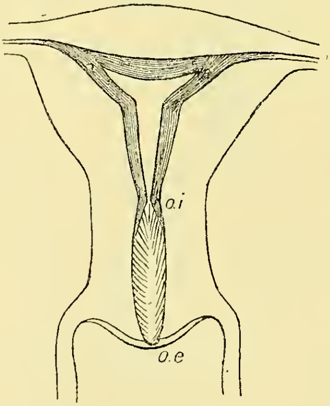

Fig. 16.

Coronal Section of Uterus (*Küstner*).

a. a. Uterine opening of Fallopian tubes; *o. i.* Os internum; *o. e.* Os externum.

Ligaments of Uterus.

The *Ligaments* of the uterus are—

Broad ligaments;
Round ligaments;
Utero-sacral and Utero-vesical.

The broad ligaments are described under the peritoneum. (See p. 40.)

Round Ligaments.

The round ligaments are two in number. According to Rainey, each springs by three fasciculi of tendinous fibres—the inner from the tendons of the internal oblique and transversalis, the middle from the superior column of the external abdominal ring near its upper part, and the outer fasciculus from just above Gimbernat's ligament. These unite into a

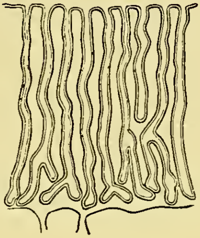

FIG. 17.

DIAGRAM of Course of GLANDS of MUCOUS MEMBRANE OF UTERUS (*Engelmann*). $(\frac{40}{1})$

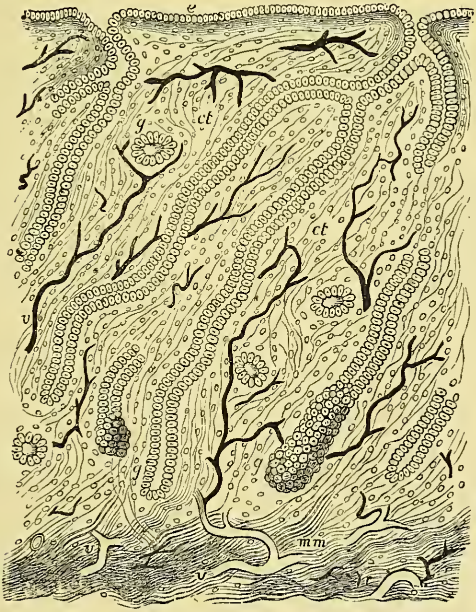

FIG. 18.

VERTICAL SECTION, through the MUCOUS MEMBRANE of the HUMAN UTERUS (*Turner*). Columnar Epithelium, the cilia are not represented; *gg* Utricular Glands; *ct*, *ct* Interglandular Connective Tissue; *vv* Blood-vessels; *mm* Muscularis Mucosae. $(\frac{450}{1})$

rounded cord which crosses in front of the deep epigastric artery and passes between the layers of the broad ligament backwards, downwards, and inwards to the anterior and superior part of the uterus. Striped and unstriped muscle, blood-vessels, etc., are found in each.

Utero-sacral Ligaments.

The utero-sacral ligaments are peritoneal folds, two in number, enclosing connective tissue and unstriped muscular fibre, passing from the lower, lateral part of the body of the uterus outwards and backwards towards the second sacral vertebra. They are known as the folds of Douglas, and form part of the upper, lateral boundaries of the pouch of Douglas. They are of the highest importance practically. The peritoneum, as it passes between uterus and bladder, constitutes the utero-vesical ligaments.

Musculature of Uterus.

The *Musculature of the Unimpregnated Uterus* is of little importance in Gynecology, and needs only a passing notice. Three coats are described :—a thin subperitoneal coat passing into the round ligaments, broad ligaments, utero-sacral and utero-vesical ligaments ; a middle coat ; and an inner concentric and very abundant layer which surrounds the Fallopian tubes, os externum, and os internum. The student should not forget that the arrangement of the muscular fibres is of the highest importance in practical obstetrics.

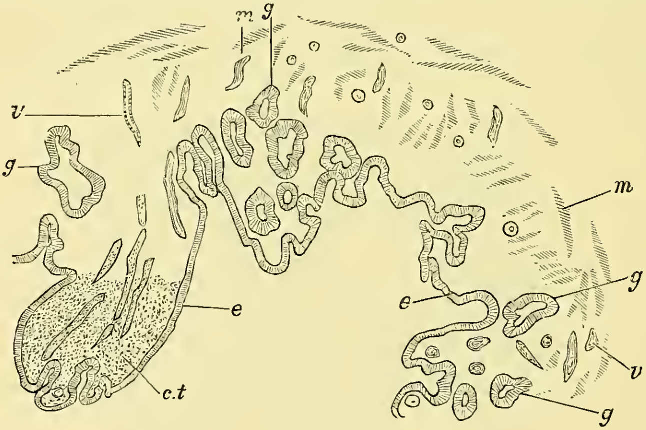

Fig. 19.

Mucous Membrane of Cervix in Microscopical Section (*de Sinéty*).

e Ciliated Columnar Epithelium, Cilia not shown ; *g* Glands ; *m* Muscular Fibre ; *v* Blood-vessels ; *ct* Connective Tissue shown only at one part of figure. $(\frac{40}{1})$

Mucous Membrane of Uterus.

The *Mucous Membrane* of the cavity of the body of the uterus is a thin reddish-gray layer, about 1 mm. ($\frac{1}{25}$ inch) thick in the unimpregnated but fully developed organ. It is set on the inner aspect of the muscular layer of the uterus without the intervention of any sub-mucous layer, is made up of ciliated columnar epithelium on a basis of connective tissue, and has numerous glands—the utricular glands. On section and microscopic examination, the glands, lined by the ciliated epithelium, lying on a thin membrana propria, can be seen coursing down obliquely from the free surface and ending at the muscular fibre. Fig. 17 shows them perpendicular, but this is less correct, as Turner's drawing indicates (fig. 18). The glands usually bifurcate at their lower ends, and two may have a common mouth. The innermost layer of muscular fibre sends up prolongations between them—muscularis mucosae.

The connective tissue in which the glands are embedded consists of delicate round and spindle-shaped cells, the former being more abundant near the surface, the latter deeper. Fibrillated bundles of connective tissue lie also between the cells and pass out between the muscular fibre of the uterine wall (fig. 18). According to Leopold, the connective tissue is in the form of a plexus of fine bundles, covered with endothelial plates each with a nucleus. The spaces between these bundles form lymph sinuses.

Mucous Membrane of Cervix.

The *mucous membrane* lining the cervix is different in arrangement and structure from that lining the cavity of the uterus. It is thrown into numerous folds, presenting to the naked eye the appearance known as the arbor vitæ, which consists of a longitudinal mesial ridge on the anterior and posterior walls, from both sides of which secondary ridges branch off obliquely. It is lined throughout with a single layer of epithelium (fig. 19), which is ciliated on the elevated portion of the ridges, but is columnar in the depressed portions (*de Sinéty*).

The upper boundary of the arbor vitæ varies. The boundary lies about midway between os externum and fundus. Before puberty, the folds pass up into the cavity of the body. In multiparæ, they do not pass up so far as in nulliparæ (Küstner).

The glands are of the racemose type, and consist of elongated repeatedly-branching ducts, which extend deeply into the connective tissue, and are somewhat dilated at their extremities (*Ruge* and *Veit*). They are lined by columnar epithelium, resting on a membrana propria, and open on the ridges and furrows of the mucous membrane.

There is a sharp line of demarcation between this single layer of epithelium (columnar and ciliated) which lines the cervical canal and the epithelial covering of the external surface of the vaginal portion, and this line of demarcation corresponds in the adult to the os externum. Beyond the os externum, the epithelial covering has all the characters of skin; it consists of vascular papillæ covered with many layers of squamous epithelium. The vascular papillæ are not easily recognised without the help of reagents (*Ruge* and *Veit*). The epithelial cells are like those found in the skin, and dovetail into one another by denticulate edges (*de Sinéty*).

It is a disputed question whether glands are present on the vaginal aspect of the normal cervix. De Sinéty says he has never met with them except in the neighbourhood of the os externum, and their occurrence there he attributes to an eversion of the mucous membrane of the canal. Ruge and Veit also consider the existence of glands as a pathological condition, which is, however, easily induced.

The normal histology of the cervix uteri has an important bearing on the pathology of the so-called ulcerations and on laceration of the cervix and ectropium.

FALLOPIAN TUBES.

Fallopian Tubes. The *Fallopian tubes* are two tubes, one on each side of the uterus, running sinuously from its upper angles out towards the side of the pelvis (figs. 20 and 50). They lie enclosed in the upper free margin of the broad ligaments, and vary in length from 10 to 16 cm. (4 to 6 inches). They are not of equal length, the right being frequently longer than the left.

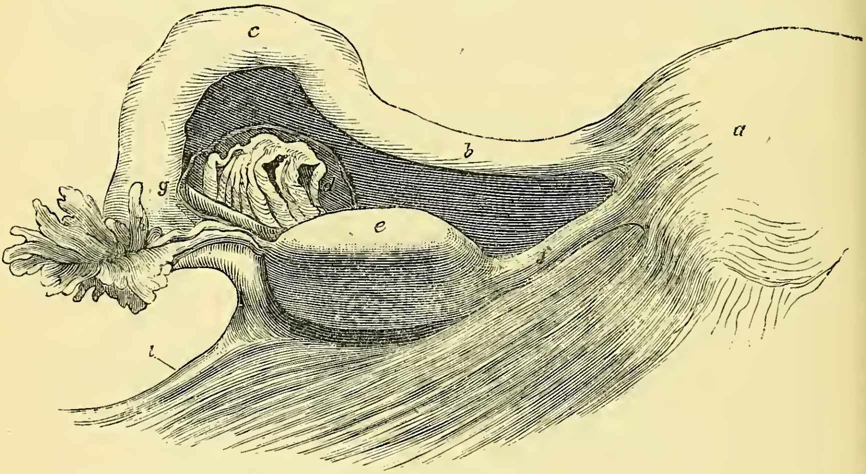

Fig. 20.

View from behind of the Lateral Angle of the Uterus, with part of the Left Broad Ligament, Fallopian Tube, Ovary, and Parovarium (*Henle*).

a Uterus ; *b* Isthmus of Fallopian Tube ; *c* Ampulla ; *g* has Parovarium to the right, and Fimbriated end of Fallopian Tube and Ovarian Fimbria just below it ; *d* Parovarium ; *e* Ovary ; *f* Ovarian Ligament ; *l* Infundibulo-pelvic Ligament ($\frac{1}{1}$). The topographical relations are disturbed here.

The Fallopian tube, the uterus lying to the front (anteverted), has been found by His to pass first outwards and then upwards over the ovary the fimbriated end lying on the posterior aspect of the ovary (Pl. I. fig. 2). Three parts come up for consideration—the isthmus, the ampulla, and the pavilion or fimbriated end.

Isthmus. The *isthmus* is the straight narrow part of the tube (fig. 20, *b*), which at its internal end opens into the uterine cavity, and has a lumen barely admitting a bristle. On transverse section the diameter of the whole thickness is about 2 to 3 mm.

Ampulla. The *ampulla* is the curved and thick part of the tube (fig. 20, *c*), having an average diameter of about 6-8 mm., with a lumen admitting the ordinary uterine sound.

Fimbriæ. The free *fimbriated end* of the Fallopian tube is expanded and funnel-shaped (infundibulum); and it is provided with primary and secondary fimbriae surrounding the opening of the tube to which they converge. One special fimbria runs to the ovary (fig. 20, *g*).

Structure of Fallopian Tube. On section the Fallopian tube is seen to be made up of three layers from without inwards: viz., peritoneum, longitudinal and circular unstriped muscular fibres (the latter being inner), and mucous membrane lined with ciliated columnar epithelium. Connective tissue and elastic fibres lie between the peritoneal and muscular layers. No glands exist in the mucous membrane which is much folded in a longitudinal direction, especially in the ampulla.

It is remarkable that the ciliated epithelium lining the Fallopian tube and pavilion should be continuous with the squamous epithelium of the peritoneum; and that, further, there is direct continuity between the vagina, uterus, Fallopian tubes, and peritoneum,—so that the peritoneal sac in the female is not closed as in the male.

Parovarium. *Parovarium or Organ of Rosenmüller.*—If the broad ligament be held between the light and the observer's eye, this rudimentary structure will be seen enclosed in its folds in the space between the ovary and ampulla (fig. 20, *d*). It consists of closed tubules lined with ciliated epithelium, which converge towards the ovary, and are united by a longitudinal one.

In the cow and sow the longitudinal tube persists, extending in the latter animal from a point a little above the division of the uterus into its cornua down the side wall of the vagina and opening into the vagina at the sides of the urethral orifice. These are named Gartner's canals after their chief investigator, and they correspond to the vas deferens, etc., in the male. Beigel has shown that these canals may be found in the uterus of the human fœtus, a statement verified by Kölliker, Dohrn, and others. According to Rieder, they may persist either as a closed muscular epithelium-lined tube or as a muscular bundle without epithelium. The epithelial lining consists of a single or double layer of cylindrical cells (cells$=16\mu.$): this is surrounded by connective tissue and by three coats of unstriped muscular fibre (inner and outer longitudinal and middle circular). It may produce one form of cervical or vaginal cyst as was shown by Von Preuschen (*v.* chapters on Ovarian Pathology and Vaginal Cysts).

OVARIES.

The ovaries, two in number, lie one on each side of the uterus, projecting markedly through the posterior layer of the broad ligament.

Ovaries. *Form, Size, and Relations.*—The ovary is a small oval-shaped body about the size of an almond, the weight of which varies from 60 to 135 grains. According to Farre its measurements are as follow :—

	Longitudinal Diameter.	Transverse Diameter.	Perpendicular Diameter.
Greatest . . .	2 in.	$1\frac{1}{12}$ in.	$\frac{1}{2}$ in.
Smallest . . .	1 in.	$\frac{1}{2}$ in.	$\frac{1}{4}$ in.
Average . . .	$1\frac{1}{3}$ in.	$\frac{3}{4}$ in.	$\frac{3}{8}$ in.

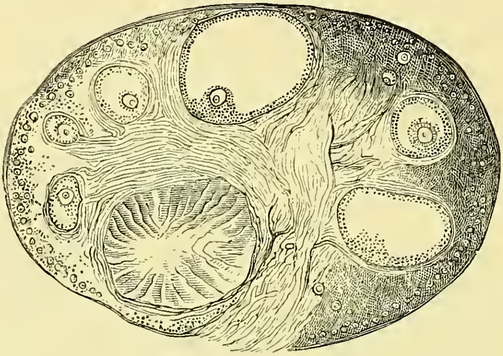

FIG. 21.

SECTION OF CAT'S OVARY (*Schrön*). The free border of the ovary is, in the fig., above; the base of attachment—hilum—below. The division into Cortical and Medullary Layers is indicated. Note smallest Graafian Follicles at surface, and larger ones not so superficial. A Corpus Luteum lies to the left of the hilum. ($\frac{6}{1}$).

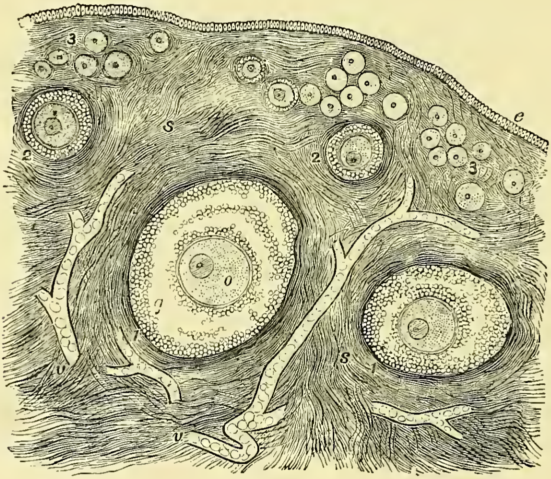

FIG. 22.

SECTION through the CORTICAL part of the OVARY (*Turner*).

e Germ Epithelium ; *ss* Ovarian Stroma ; 1, 1, large-sized Ovarian Follicles ; 2, 2, middle-sized ; and 3, 3, smaller-sized Graafian Follicles ; *o* Ovum within Graafian Follicles ; *v*, *v*, Blood-vessels in the Stroma ; *g* Cells of Membrana Granulosa.

The ovary has an anterior and posterior border, and an upper and lower surface. The posterior border is convex and free, the anterior flattened and attached to the broad ligament. It should be noted that this anterior border is called the hilum, and that the blood-vessels and nerves enter there.

The position of the ovary will be discussed afterwards (p. 57), but at present it is sufficient to consider it as lying behind the broad ligament suspended as it were by the infundibulo-pelvic ligament so that its long axis lies more or less parallel to the axis of the brim of the pelvis.

Ligaments of Ovary.

Ligaments of the Ovary.—In addition to the attachment which the broad ligament gives to the ovary, two important ligaments are described —the ovarian ligament and the infundibulo-pelvic ligament.

Ovarian Ligament.

The *Ovarian Ligament* (fig. 20, *f*) is about 3 cm. ($1\frac{1}{5}$ inch) long, and extends from the inner end of the ovary to the corresponding upper angle of the uterus, just below the uterine origin of the Fallopian tube. It is a longitudinal fold of the peritoneum into which the unstriped muscular fibre of the uterus is prolonged.

Infundibulo-Pelvic Ligament.

The *Infundibulo-Pelvic Ligament* (fig. 20, *l*) is about 2 cm. long, and runs from the outer end of the Fallopian tube to the side wall of the pelvis. It is simply that part of the upper margin of the broad ligament unoccupied by Fallopian tube.

Ovarian Fimbria.

The *Ovarian Fimbria* (fig. 20, *g*) prevents the separation of the ovary and infundibulum tubæ.

Thus the ovary is kept in position by its attachment to the broad ligament, by the ovarian and by the infundibulo-pelvic ligaments. Its own specific gravity has also a share, *i.e.*, the ovary floats at a certain level.

Structure of Ovary.

Structure of the Ovary.—The ovary is covered with epithelium differing from the squamous epithelium of the peritoneum in being made up of columnar nucleated cells with a dull lustre. It is continuous, however, with the peritoneal epithelium, the line of contact being marked by a whitish and elevated line. The epithelium covering the ovary is known as the germ-epithelium. This distinctive term is of importance in connection with the development of the ova, and will be more particularly alluded to afterwards. A tunica albuginea made up of condensed connective tissue has been described as lying below the germ-epithelium.

On section and microscopical examination, the ovary is found to consist of connective tissue with the structures known as the Graafian follicles embedded in it, along with blood-vessels, nerves, lymphatics, and some unstriped muscular fibre. These are enclosed in the epithelial covering already described. The connective tissue is divided into a cortical and medullary layer ; the former lying beneath the peritoneum, the latter being at and near the hilum (fig. 21). The medullary layer is very vascular, and has some unstriped muscular fibre round the branches of the ovarian artery (fig. 22).

The Graafian follicles are scattered through the whole substance of the ovary. The following points should be carefully noted:—

a. The younger and smaller Graafian follicles lie in the cortical layer. Their diameter is generally about $\frac{1}{100}$ in., and they exist in immense numbers. According to careful estimates, the ovary of a female infant may contain 40,000 to 70,000 such follicles.

b. The larger follicles are much fewer in number and lie deeper in the ovary. Diameter $\frac{1}{30}$th to $\frac{1}{100}$th in.

c. There are also still larger follicles nearer the surface than the latter. These have advanced from the deeper layer (*vide* under Menstruation).

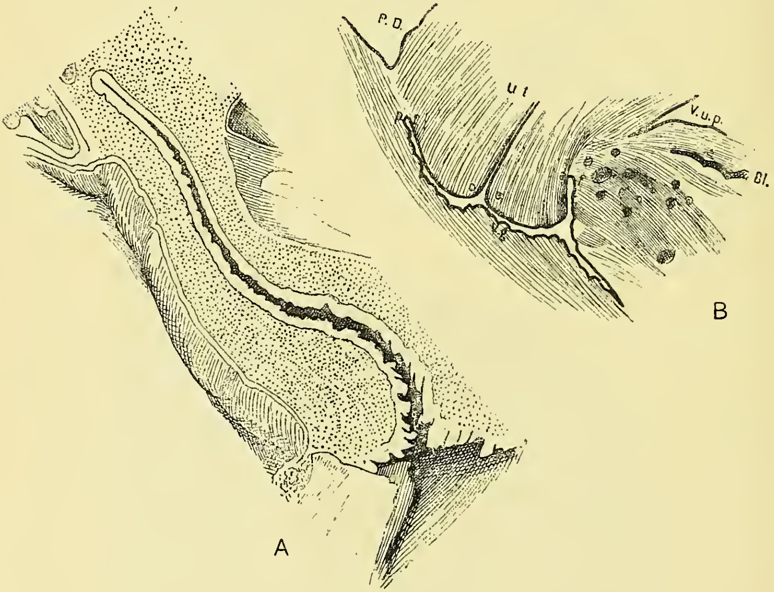

Fig. 23.

A Section of Whole Vagina passing through Lateral Fornix; and *B* Section of Upper Third passing through the Cervix Uteri (*Hart*).

p. d. Pouch of Douglas; ut Uterus; o e Os Externum; Vg Vagina; p f Posterior Fornix; a f Anterior Fornix; V.u.p. Vesico-uterine Peritoneum; Bl. Bladder.

Structure of a Graafian Follicle. This consists of

1. A Tunica fibrosa and Membrana propria;
2. The Membrana granulosa, a layer of nucleated columnar epithelial cells forming the discus proligerus at one part;
3. Fluid—the liquor folliculi.

The *ovum* (diameter $\frac{1}{100}$ to $\frac{1}{130}$ in.) lies in the discus proligerus; it has the following structure:—

1. External envelope—zona pellucida, a homogeneous membrane,
2. Yelk protoplasm,
3. Germinal vesicle ($\frac{1}{700}$th in. diameter),
4. Germinal spot ($\frac{1}{3000}$th in. diameter).

THE VAGINA.

Vagina—Position.

The vagina is a mucous slit in the pelvic floor, extending from the hymen to the cervix uteri, and lying between the urethra and bladder in front and the rectum behind. In the upright posture it makes an angle of about 60° with the horizon, *i.e.*, it is nearly parallel to the pelvic brim.

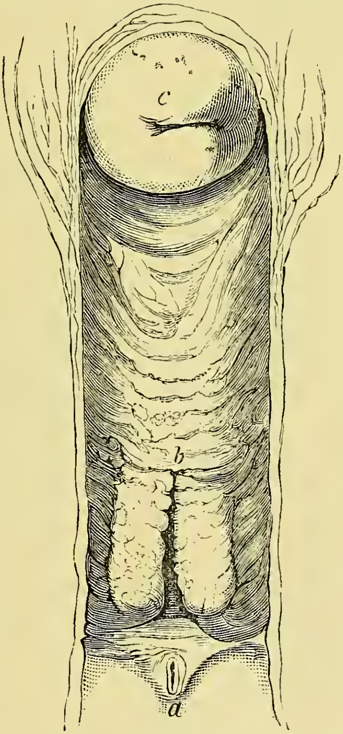

Fig. 24.

Anterior Vaginal Wall and Multiparous Cervix, looked at from behind (*Henle*). *a* Urethral Orifice; *b* Anterior Vaginal Column; *c* Cervix Uteri. ($\frac{1}{1}$)

Vaginal Walls.

The vagina has two walls, an anterior and posterior, which are continuous at their sides. The anterior vaginal wall is triangular in shape, the base being above. Its lower limit is marked out by the hymen.

At its upper end it is reflected down to a small extent on the anterior lip of the cervix uteri, the anterior fornix being thus formed (fig. 23). It is closely incorporated with the urethra, but between it and the posterior aspect of the bladder there is loose connective tissue. Its length is about 5 cm., *i.e.*, 2–2½ inches.

Vaginal Mucous Membrane. The mucous membrane of the wall is arranged in folds roughly transverse. At its lower end is a vertical mesial single or double thickening of the mucous membrane, about 2 cm. long, known as the anterior vaginal column (fig. 24, *b*). This begins near the urethral orifice, or about 1½ cm. above it. According to Budin, the columns are prolonged on the hymen.

The posterior vaginal wall is triangular in shape, and extends from the vaginal orifice upwards to the cervix uteri, upon which it is reflected, thus forming the posterior fornix vaginæ, which is deeper than the anterior one. Its length is about 7½ cm. (3 inches) *i.e.*, about 2½ cm. (nearly an inch) longer than the anterior. It is also transversely rugous, and has a posterior column analogous to the anterior, but smaller.

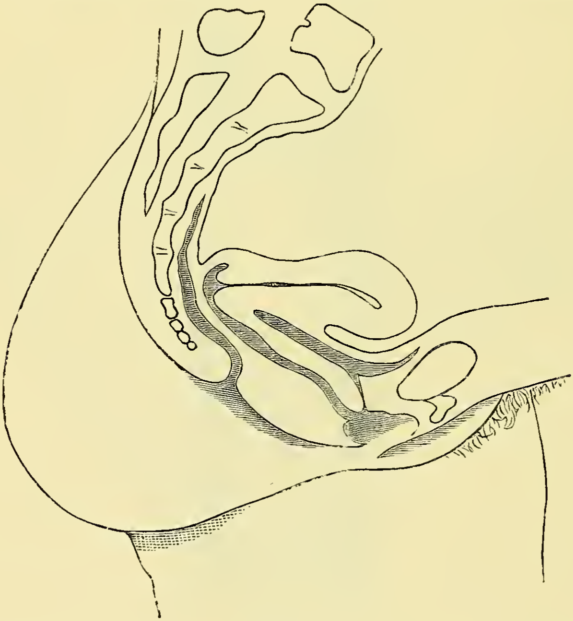

Fig. 25.

Diagram of Vertical Mesial Section of Female Pelvis, showing Sigmoid curve of posterior Vaginal Wall (*Schultze*). (¼)

While the direction of the anterior vaginal wall is almost straight, that of the posterior vaginal wall is sigmoid (fig. 25). The curve varies, however, according to the position of the uterus and the fulness or emptiness of the adjacent bladder and rectum.

When the bladder and rectum are empty, we find the direction of the vagina parallel to the pelvic brim. When the bladder is distended, the vagina is, chiefly at its upper part, driven nearer the sacrum; while, if the rectum be distended, the vaginal axis may be almost perpendicular.

Structure of Vagina.

Structure of Vagina.—The vaginal wall, on section and microscopical examination, is found to consist of mucous membrane, made up of epithelium (the superficial layer being squamous and nucleated, the deeper layer cylindrical and with elongated nuclei), connective tissue, elastic tissue, and some unstriped muscular fibre. The superficial layer of the connective tissue forms papillæ, into which blood-vessels project. The epithelium is therefore ridged. External to this lie two layers of

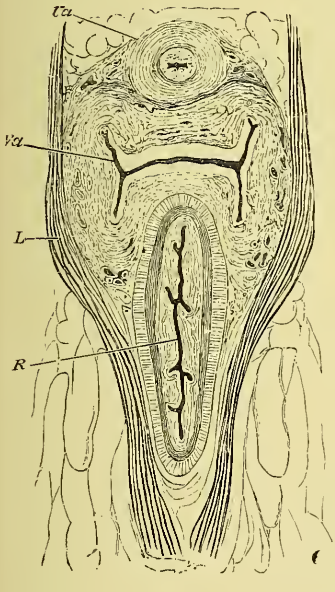

Fig. 26.

Horizontal Section of the Pelvic Floor at the Pelvic Outlet (*Henle*).

Ua Urethra; *Va* Vagina; *R* Anus; *L* Levator Ani.

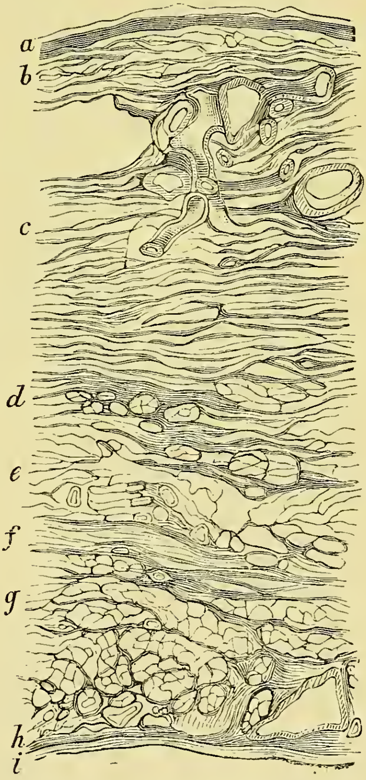

Fig. 27.

Horizontal Section of the Posterior Wall of Bladder and the Anterior Wall of the Vagina (*Henle.*)

a Epithelium of the Bladder; *b* Mucosa; *c* Layer of circular fibre; *d* Layer of longitudinal fibres; *e* Loose Tissue; *f* Layer of circular fibres; *g* Layer of longitudinal fibres; *h* Mucosa; *i* Epithelium of Vagina. $(\frac{15}{1})$

unstriped muscular fibre; the inner longitudinal, the outer circular (*Henle*). Breisky alleges the inner to be circular. Von Preuschen has described glands in the vagina but they are very few in number. He found the ducts lined with squamous epithelium and the deeper part with ciliated epithelium—the latter being continuous with the cylindrical deep cells of the vagina. Gland-like crypts and lymph follicles also exist (*Löwenstein*) (fig. 27). The whole is surrounded by loose connective tissue, containing the outer venous plexus of the vagina (fig. 27).

As already said, the vagina is a mere slit in the pelvic floor, although it is often erroneously described as a tube or cavity. On vertical section, as fig. 23 shows, it appears as a mere linear slit; while on transverse section it is H-shaped, or crescentic (figs. 26 and 44). The vagina is eminently dilatable and its walls separable, as will be more fully considered under the structural anatomy of the pelvic floor; but this dilatation or separation is the result of posture with manipulation, or of parturition. Under mere changes of posture the vagina retains its slit-like form.

THE BLADDER.

Position.—The empty female bladder lies behind the pubes and in front of the vagina. We here consider the urethra and bladder.

Urethra—position.

Microscopic Structure.

Skene's Tubules.

The urethra is a straight slit (some describe it as sigmoid) about 1$\frac{3}{8}$ inches long, with thick walls closely incorporated with the anterior vaginal wall behind. It runs parallel to the plane of the pelvic brim. Its lower opening is known as the meatus urinarius, the position of which has been already considered in the section on the External Genitals; its upper opening is at the neck of the bladder. On section and microscopical examination, its mucous membrane is found covered with squamous epithelium in its lower part; while higher up it is like that of the bladder, and is very rich in elastic fibres. There is a double layer of *unstriped* muscular fibre, the longitudinal layer being internal and the circular outside; and, according to Uffelman, a circular (inner) and longitudinal layer of *striped* muscle, which stretches from the neck of the bladder to within 6 in. (1$\frac{1}{2}$ cm.) of the meatus urinarius. Luschka also describes a special sphincter of the vaginal and urethral orifices. It should be further noted that the mucous membrane is folded longitudinally, and contains mucous glands lined with cylindrical epithelium, papillæ, and lacunæ, and also villous tufts near the meatus; and that there is a submucous layer between the mucous membrane and unstriped muscle, containing many veins. Recently Skene of New York has described two tubules in the female urethra. They lie on each side (figs. 28 and 29), "near the floor of the female urethra, and extend up from the meatus urinarius for about $\frac{3}{4}$ inch They lie beneath the mucous membrane, and in the muscular walls of the urethra." We have in section of the female urethra:—

Mucous membrane;
Submucous layer;
Muscular layer, longitudinal and circular, unstriped;
do. do. striped (*Uffelman*).

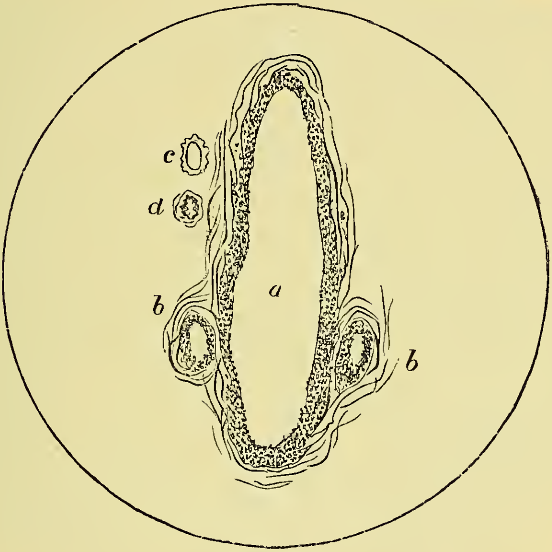

Fig. 28.

Transverse Section of Urethra much enlarged (*Skene*).
a Urethral Canal; *b b* Glands described by Skene; *c* Vein; *d* Artery.

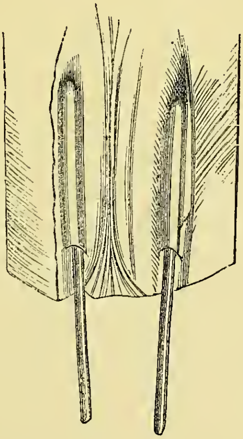

Fig. 29.

Urethra Laid Open from above, showing glands with probes passed in (*Skene*).

External to these, there is the anterior vaginal wall behind and loose tissue in front.

According to Henle, the closed urethral slit is on section transverse near the bladder, sagittal at the meatus, and star-shaped between these two points.

Bladder—Openings. In the bladder proper we have three openings—the internal orifice of the urethra and the orifices of the two ureters. The latter lie one on each side, about $1\frac{1}{2}$ inches from the internal orifice. These openings give us the landmarks for the division of the bladder into neck, base, and body. All above the lines joining the ureteric openings and the centre of the symphysis is the body; all below is the base, and that portion between the ureteric openings and the internal orifice is the trigone. Just above the ureters is the *bas fond.*

Structure of Bladder. The wall of the bladder is made up of three layers, viz., a mucous, a muscular, and a peritoneal.

The mucous membrane consists of connective tissue lined by several layers of transitional or multiform epithelium (fig. 30). It is arranged in folds, except over the trigone and openings. The folds or rugæ are due to the laxity of the submucous coat.

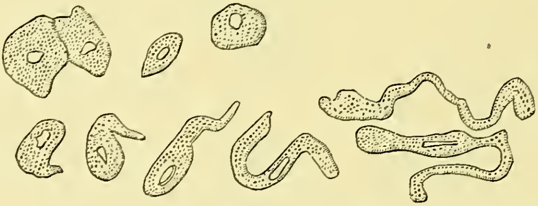

Fig. 30

Epithelial Cells from the Mucous Membrane of the Bladder. Those in the upper row are the superficial squamous cells; those in the lower row are the peculiar cells of the middle stratum (*Turner*).

The muscular coat of the bladder is of the unstriped variety, and has a complicated arrangement. There are external longitudinal fibres, circular fibres within these, and an internal longitudinal layer on which rests the submucous coat. It is disputed whether there is a sphincter at the neck of the bladder. Probably there is not; but the puckering of the mucous membrane at the neck is alleged to have a valve-like function.

The peritoneal covering of the bladder will be considered subsequently.

Ureters. The relations of the ureters are of importance with regard to inflammatory exudations, fistulæ, and excision of the uterus for cancer.

To Freund and Joseph, Luschka, Garrigues, Holl, and Polk, we are indebted for anatomical researches as to the course of the ureter in the pelvis. We give Holl's drawing of the right ureter (fig. 31), and follow in the main his description.

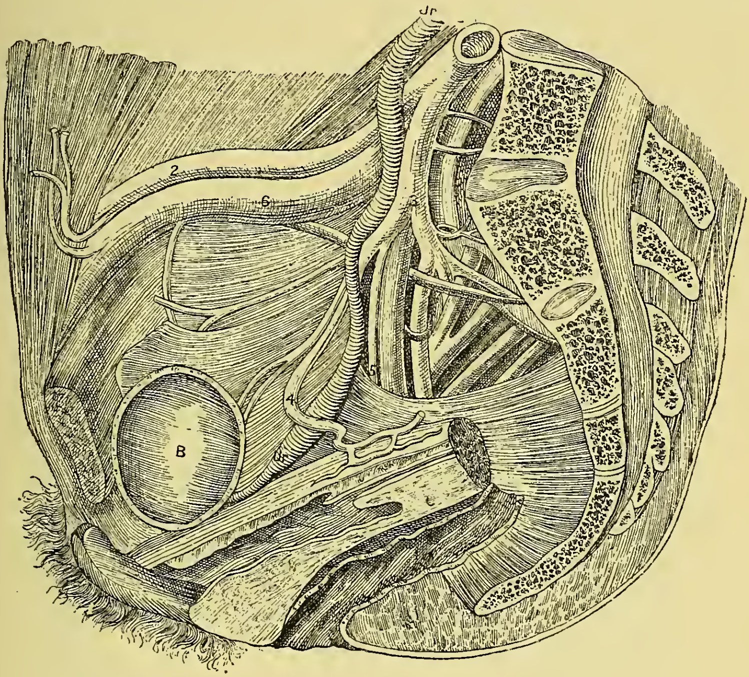

Fig. 31.

Relation of Ureter on the Right Side of a Dissected Pelvis (*Holl*).

V Vagina ; C Cervix ; B Bladder ; Ur, Ur, Ureter.
1 Common iliac artery ;
2 External iliac artery ;
3 Internal iliac artery ;
4 Uterine artery ;
5 Pudic artery ;
6 External iliac vein.

Its course may be conveniently described in four portions.

(1.) *From the brim of the pelvis to the origin of the uterine from the internal iliac artery.* About ·6 inches ($1\frac{1}{2}$ cm.) below the division of the common iliac artery into its external and internal branches, the Ureter passes over the external iliac vessels, and lies in front of the internal iliac artery and then in the space between the internal iliac artery and external iliac vein. So far, the portion described is at or about the level of the pelvic brim.

The Ureter next passes down into the true pelvis, and at the origin of the obturator, vesical, and uterine arteries begins to describe a bow-shaped portion $3\frac{3}{5}$ inches (9 cm.) long, with the greatest convexity of the bow where the uterine artery crosses it. By this crossing, the bow-shaped portion of the Ureter is divided into an upper and a lower part.

(2.) *From the origin of the uterine artery to where the Ureter is crossed by it.* This is the *upper* part of what is known as the bow- or spindle-shaped portion.

(3.) *From where the Ureter is crossed by the uterine artery to the bladder*—the lower part of the spindle-shaped portion.

The uterine artery as it crosses the Ureter is separated from it by a venous plexus. In this way, a distance of about ⅖ inch (1 cm.) separates Ureter and uterine artery at this point.

At the level of the os uteri externum the uterine artery crosses the Ureter to reach the uterus, and at this point the Ureter is ⅗ inch (1½ cm.) distant from the cervix. The course of this portion is of great importance. It is 1·6 inch (4 cm.) long, lies in relation to the side of the vagina, and then for the last two centimetres, before it pierces the bladder, lies between the anterior vaginal wall and the posterior wall of the bladder. The Ureter does not pass lower, therefore, than about the middle of the anterior vaginal wall.

(4.) *The portion piercing the bladder.* The Ureter runs through the bladder wall obliquely downwards and inwards for from ·6 to ·8 inches (1·5 to 2 cm.).

Shape and Position of Bladder.

Shape of empty Bladder and changes in its position.—The empty

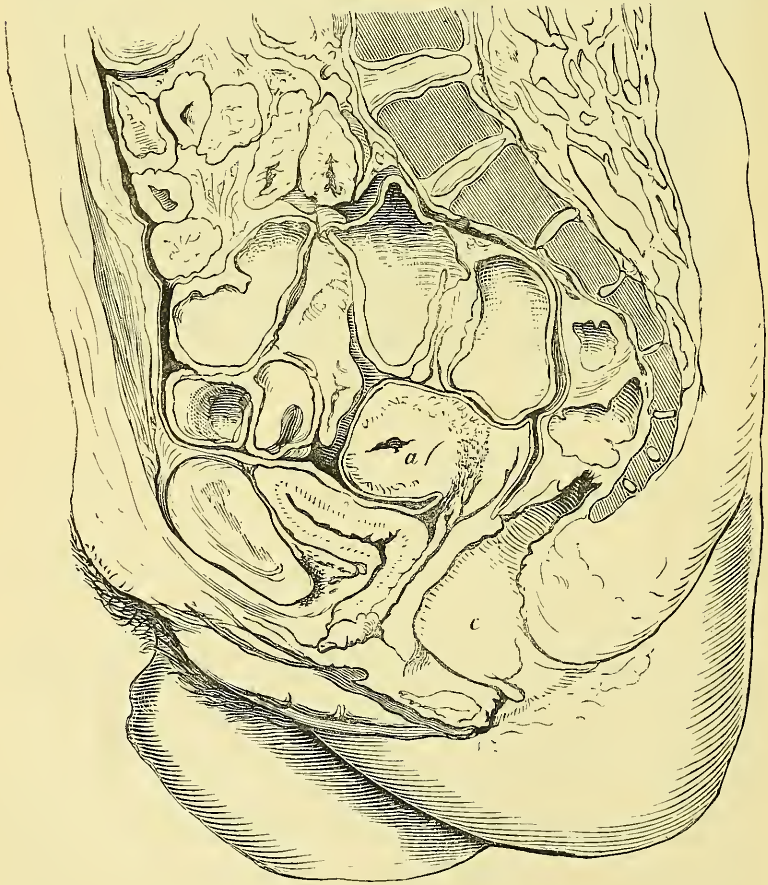

Fig. 32.

Vertical Mesial Section of Female Pelvis, showing Y-shape of Bladder (*Fürst*). *a* uterus, *b* bladder, *c* rectum. (½) female bladder lies completely behind the pubes, and has its fundus covered by peritoneum. When empty and viewed in mesial section it may present one of two shapes. In the large majority of specimens figured, it forms with the urethra a Y-shape on sagittal mesial section. The oblique legs of the Y may be about equal in size, or the posterior may be shorter (figs. 32, 38). This form is so common that it has been accepted hitherto by all authors as the normal one. In certain cases, however, but not in so many as the former, the empty bladder cavity forms with the urethra a continuous tube on vertical mesial section (fig. 33). In such cases, it is oval in shape, corrugated, and firm to the touch. This latter shape is the one always found in the lower animals, such as the rabbit and dog, and is the only one seen in the human fœtus. If, therefore, the pelvic floor be viewed on its peritoneal aspect, the fundus of the empty bladder will be found to be very often large and concave, while in some cases it is small and convex. In the former case, the inner surface of the upper segment of the bladder, large in area, is in contact with the surface of the lower segment; in the latter, the anterior and posterior walls, small in area touch one another.

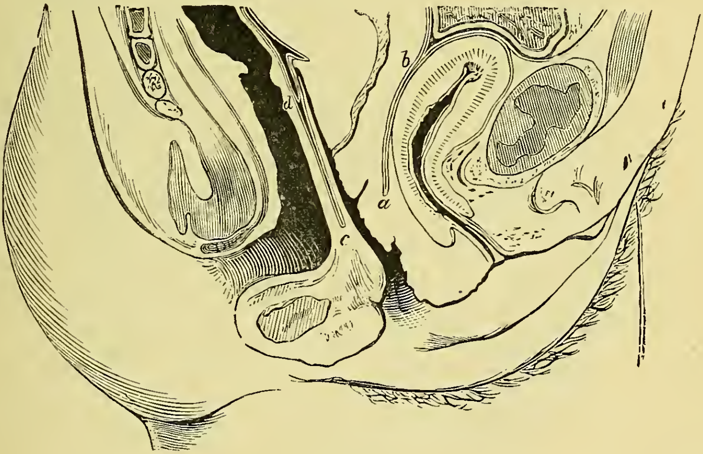

Fig. 33.

Vertical Mesial Section of Female Pelvic Floor, showing contracted bladder in a suicide (*Braune*). The peritoneum descends in front of the uterus to *b* and behind it to *d*; *b a* and *d c* are loose extra-peritoneal tissue. ($\frac{1}{2}$)

It is probable that when the bladder has the Y-shape on section, it is relaxed and empty (fig. 32); and when the oval shape (fig. 33), it has been caught in systole. The bladder contracts to expel the urine and then relaxes. Between the acts of urination the bladder is therefore only a flaccid sac. Some additional facts as to the position and distention of the bladder are best considered further on, under the structural anatomy of the pelvic floor. We may here state, however, that (1) when empty, in the non-parturient female, it is behind the pubes (fig. 40); (2) it is drawn above the pubes in the parturient female; (3) it is tilted above the pubes in retroversion of the gravid uterus.

RECTUM.

Rectum. The *Rectum* is not separated by any division from the sigmoid flexure, but may be defined as extending from the left sacro-iliac synchondrosis to the anus. It curves downwards, backwards, and inwards, to about the third sacral vertebra. This is known as the first part of the rectum; it is completely covered by peritoneum, which forms the mesorectum. The peritoneum is reflected from the rectum on to the upper part of the vaginal wall, about 3 inches above the vaginal orifice. Thereafter, the rectum lies in relation anteriorly to the posterior vaginal wall to which it is loosely attached until about 1½ inches from the anus.

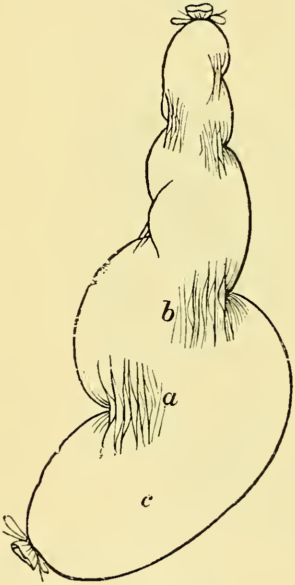

Fig. 34 *a*.

Rectum Inflated (*Chadwick*).
a b Sphincter tertius; *c* Ampulla of Rectum.

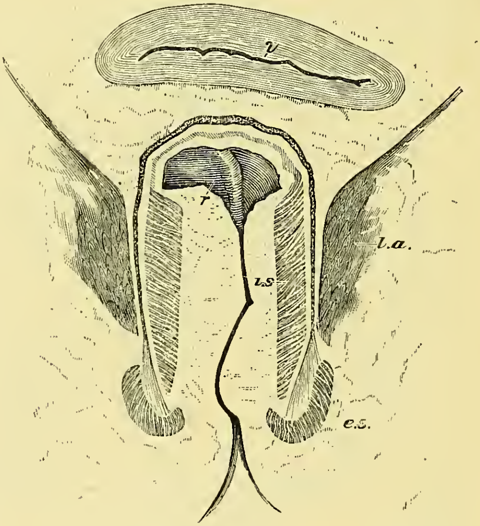

Fig. 34 *b*.

Coronal Section through Anus (*Symington*).
r rectum; *i s* internal sphincter; *e s* external sphincter; *l a* levator ani; *v* vagina.

The rectum is made up of peritoneal investment; unstriped muscular fibre in two layers, longitudinal and circular, the former being the outer; a submucous coat; and a mucous lining with its muscularis mucosae, columnar epithelium, no villi, but with Lieberkuhnian follicles closely set together. At the upper limit of the anus, the circular fibres are very well marked, and constitute the sphincter ani internus (fig. 35).

Microscopic Structure of Rectum.

Certain oblique folds in the rectum—consisting of mucous, submucous,

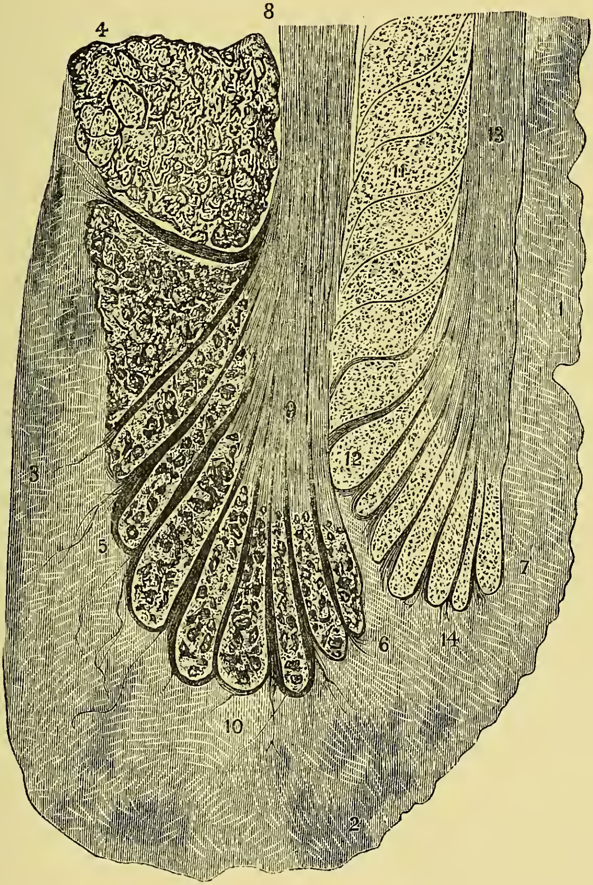

Fig. 35.

Perpendicular Section through the end of the Rectal Wall enlarged (*Ruedinger*).

1 Mucous Membrane of the Rectum ; 2 boundary between Mucous Membrane and skin of buttock ; 3 Fat ; 4 Levator Ani ; 5 Sphincter Ani externus ; 9 Fibres of Longitudinal Layer separating external Sphincter into parts ; 7 Sphincter Ani internus ; 8 Longitudinal Fibres of muscular coat, which radiate outwards at 9 ; 13 Longitudinal Fibres of Muscularis mucosae which radiate outwards at 12 ; 11 Circular Fibres of muscular coat ; 6, 10, and 14 Slips of muscular fibre passing into tissue beyond.

and circular unstriped muscular coats—are of special interest. One exists $1\frac{1}{2}$ inches from the anus, another is near the sacral promontory, and one is intermediate (*Turner*). The lowest (the valve of Houston or sphincter ani tertius of Hyrtl) has been described by Chadwick of

Boston, as being not an entire circular fold, but made up of two semicircular constrictions, one on the anterior wall, and one on the posterior an inch higher up (fig. 34 *a*).

Anus.

The *Anus* is that part of the rectum at its external orifice. It is about an inch long, and has its long axis directed backwards and cutting the axis of the vagina at about a right angle. The rectum, therefore, when in contact with the posterior vaginal wall closely follows its direction, but at a little above the anus turns sharply backwards. There is thus left between it and the last 1½ inch of the posterior vaginal wall, an angular interspace to be filled up by the structure known as the perineal body.

During life, the anus is closed by its sphincters in such a way that the lateral walls are in contact (Symington). This explains that the apparent gaping of the anus in sagittal mesial sections is approximately right (*v.* Plate I.), and that the appearance figured at page 67 is wrong.

Fig. 35, from Ruedinger, shows the arrangement of voluntary and involuntary muscle in the anus. The division of the external sphincter into two parts, and the separation of the lower division (5) into compartments by fibres from the longitudinal unstriped layer (9), are noteworthy. Similarly the internal sphincter (7) is divided into compartments by fibres from the muscularis mucosae (13). Near the anal orifice the mucous membrane has certain perpendicular folds in it known as the Columnae Morgagni, with depressions between these—the Sinus Morgagni (fig. 2, *a*).

PERINEAL BODY.

Perineal body.

The posterior vaginal wall is in contact with the anterior rectal wall, for about 1½ inches above the apex of the perineal body, there being only loose tissue between. The anus has its long axis directed backwards, while the vaginal axis runs forwards; we thus get a pyramidal space filled up by the structure known as the Perineal body (*Henle* and *Savage*).

The Perineal body is made up of muscular insertions and origins (striped and unstriped), and fibrous and elastic tissue. Its base is covered by the skin lying between the anus and vagina; its anterior side is in great part below the level of the posterior vaginal wall: its posterior side lies in front of the anterior rectal wall and anus; while laterally, it is bounded by fat. The voluntary muscles passing into it are the sphincter ani, transversus perinei, bulbo-cavernosus, and levator ani (fig. 7).

This Perineal body measures about 1½ inches (4 cm.) vertically, the same transversely, and ¾ in. antero-posteriorly. If a straight line be made to join the tip of the coccyx and the subpubic ligament, it will just clear the apex of this structure.

Its functions are important, but have been both exaggerated and underrated. It gives a fixed point for many muscles, prevents pouching of the rectum forwards, and strengthens that part of the pelvic floor which has no posterior bony support.

Its special significance, however, will be considered further on.

At present, the nomenclature in regard to the "Perineal region" is exceedingly vague—the term Perineum being used in this general sense by accoucheurs, especially in regard to the tears caused by parturition. It is better to speak of these as tears of the hymen, fourchette, and perineal body, instead of saying "perineal tears." The surface between the anal and vaginal orifices is, strictly speaking, not the perineum but the "skin over the base of the perineal body" and "the fourchette."

PERITONEUM.

Pelvic Peritoneum.

This is the thin serous covering of the concave surface of the pelvic floor and the organs resting on it. A knowledge of its disposition is of the highest importance to the gynecologist. This is best considered as follows.

1. *The Pelvic Peritoneum followed in a Vertical Mesial Section and from before backwards.*—The Peritoneum of the anterior abdominal wall is reflected, at a point a little above the symphysis pubis, on to the fundus of the empty bladder (figs. 36 and 37). It passes downwards over the posterior surface of the bladder, from which it crosses on to the anterior surface of the uterus at a point about the level of the os internum. From this it passes up over the anterior surface of the uterus. Thus there is formed a vesico-uterine pouch, containing no small intestine either when the bladder is in systole or in diastole (figs. 36 and 37). When the bladder has the Y-shape in pathological anteflexion, the peritoneum passes directly backwards across the fundus of the bladder and on to the anterior surface of the uterus at or below the level of the os internum (fig. 38). There is thus produced a utero-abdominal pouch (fig. 38).

Vesico-uterine Pouch.

The peritoneum covers the whole of the anterior surface of the uterus above the os internum, passes over the fundus, and down the posterior surface which it covers almost completely. From this it descends still deeper, on to the posterior aspect of the posterior vaginal wall for about one inch (fig. 36). The depth of the peritoneal pouch thus formed behind the uterus is greater on the left side than on the right. The amount of its dip varies. In one section by Pirogoff (fig. 39) the peritoneum runs down on the posterior vaginal wall till within about an inch from the vaginal orifice. This extent of posterior peritoneal duplicature is abnormal. This variation in depth is quite evident in sections: in some it ends at the level of the posterior fornix (fig. 37), while in others it is seen passing as deeply as has been already described (figs. 36, 39). This descent of the peritoneum behind the uterus is of the highest importance practically, and forms the well-known pouch of Douglas. This pouch is best defined as follows:—Its upper lateral boundaries are the utero-sacral ligaments; its anterior boundary is the uppermost inch of the posterior vaginal wall and posterior aspect of the supra-vaginal portion of cervix; its posterior boundary is the sacrum and rectum, covered by peritoneum. It is the lowest part of the peritoneal cavity, and from its relation to the posterior vaginal wall can be explored through the posterior vaginal fornix. It is partially filled by intestine when the uterus lies to the front, which becomes displaced when the uterus is retroverted or retroflexed.

Pouch of Douglas.

Broad Ligaments.

2. *The Disposition of the Pelvic Peritoneum at the sides of the Uterus: Broad Ligaments.*—At the sides of the uterus, the peritoneum clothing its anterior and posterior surfaces passes outwards and somewhat backwards to the sides of the pelvis in front of the sacro-iliac synchondrosis. In this way we get two laminæ of peritoneum nearly in apposition, which become more separated at their junction with the pelvic floor and sides of the pelvis; the space between the laminæ is, at its outermost part, in relation to the obturator internus muscle (*v.* Chap. II.). These are the broad ligaments of the uterus.

Immediately within their upper free margin, the Fallopian tubes are placed. That part of the free margin not occupied by Fallopian tube forms the infundibulo-pelvic ligament of the ovary (figs. 20 and 50). Projecting through the posterior lamina of the broad ligament is the ovary, covered by its germ-epithelium. The ovarian ligament and parovarium have already been described under the ovary and Fallopian tube.

Between the layers of the broad ligament lie connective tissue, unstriped muscle, blood-vessels, and lymphatics. According to M. Guérin, the broad ligaments enclose a small space shut off from the rest of the cellular tissue of the pelvis, and he denies that as yet there is proof of any special diagnosable inflammatory affection of the broad ligaments. Guérin alleges that, by inflation, it can be demonstrated that the broad ligaments are thus shut off—a fact denied by other observers.

The position of the broad ligaments varies according to that of the uterus. When the uterus is normal in position, *i.e.*, lying to the front, their posterior surfaces look upwards and somewhat backwards, and they run outwards and backwards as already described. Displacement of the uterus backwards causes their coincident displacement, and in pregnancy they are drawn up and lie almost vertically. Pathologically, they cicatrize after inflammatory attacks and cause unilateral deviations of the uterus.

Peritoneum on side walls of Pelvis.

3. *The Pelvic Peritoneum on the side walls of the Pelvis.*—The pelvic peritoneum clothes the side walls of the pelvis. It dips down least at the sides of the bladder, and most at the utero-sacral ligaments.

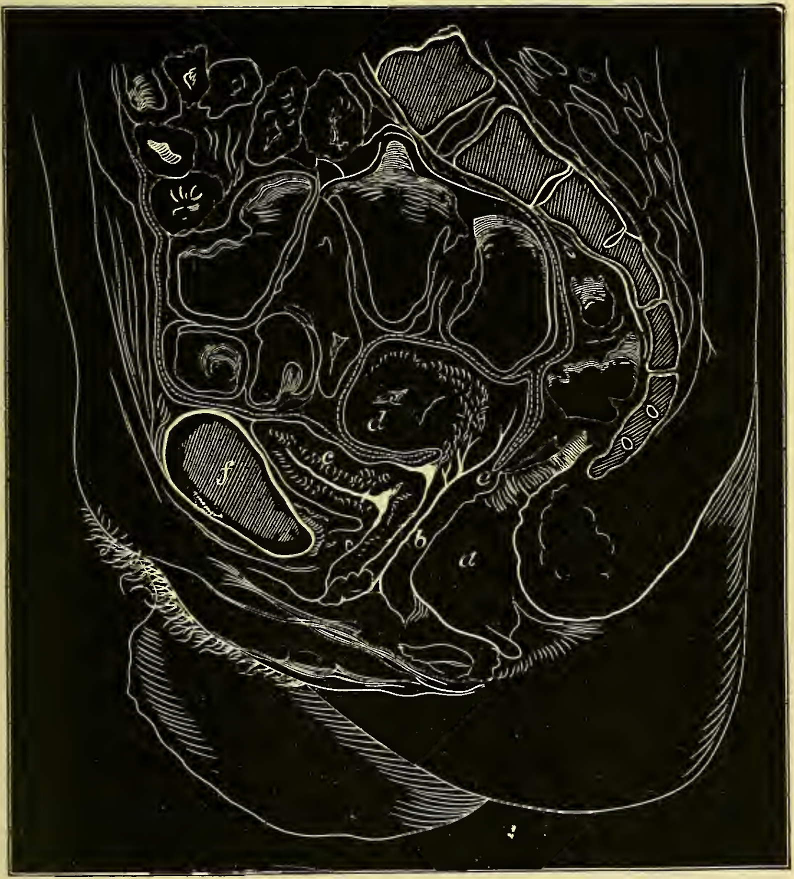

FIG. 36.

FROZEN SECTION showing Peritoneum (*Fürst*). The dotted line indicates Peritoneum in this and figs. 37–42. *a* Anus; *b* Vagina; *c* Bladder; *d* Uterus; *e* below pouch of Douglas; *f* Symphysis Pubis. (½)

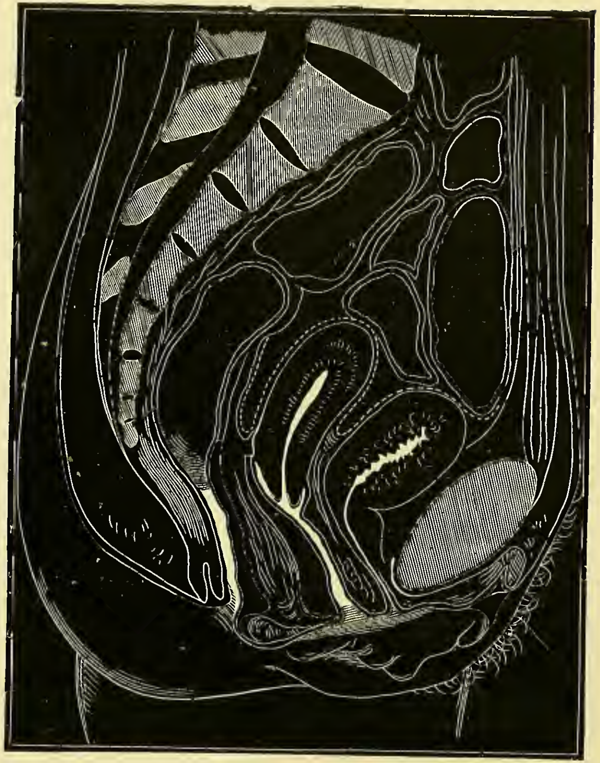

Fig. 37.

Frozen Section showing Peritoneum in contracted bladder (*Heitzmann*)

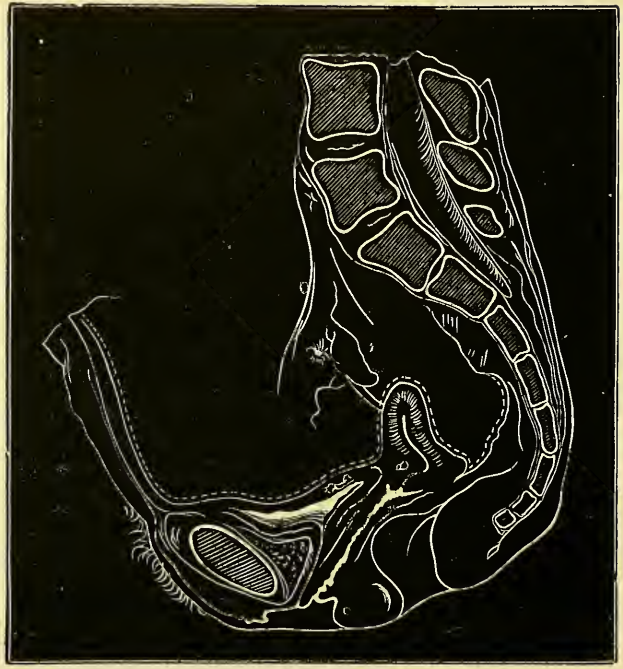

Fig. 38.

Section (Spirit-hardened) showing Peritoneum when Uterus is drawn back by utero-sacral cellulitis (*Hart*).

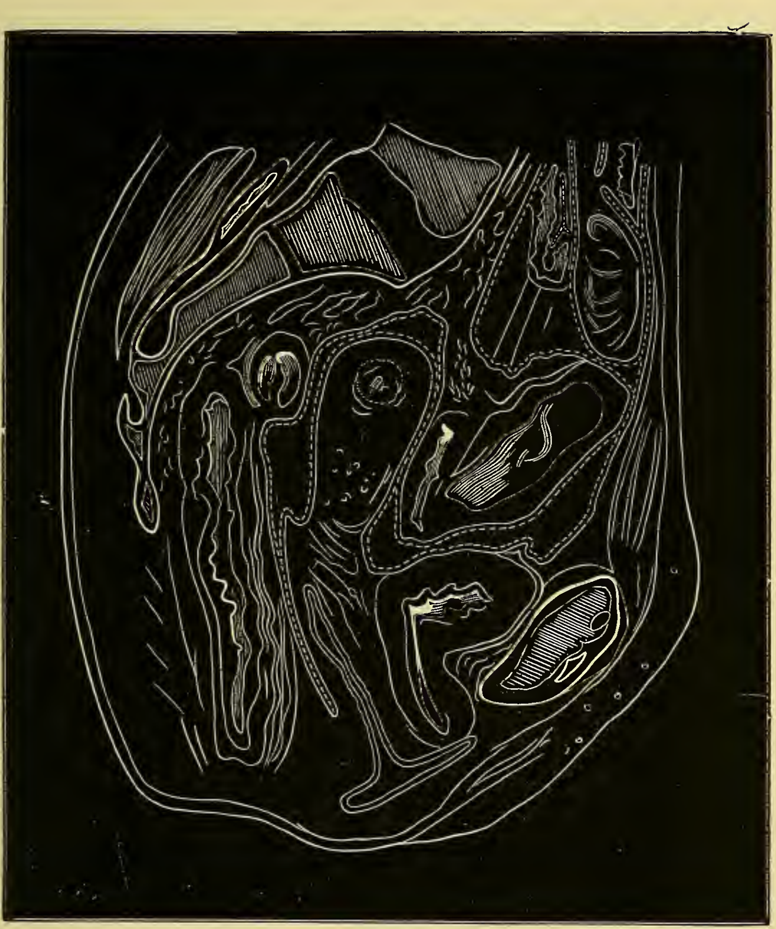

FIG. 39.
PERITONEUM DIPPING ABNORMALLY DEEP between Rectum and Vagina (*Pirogoff*).

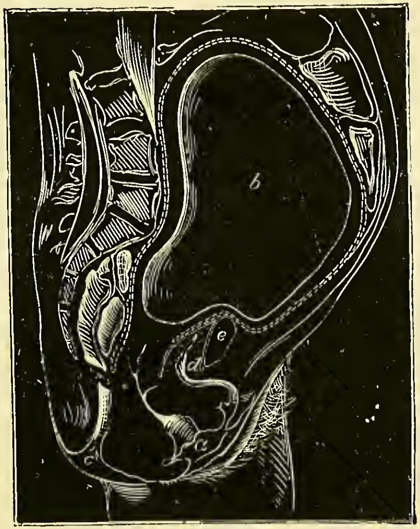

Fig. 40.

Relation of Peritoneum to Bladder at end of Pregnancy (*Braune*). (Frozen.)

a Vaginal Entrance; *b* Uterus; *c* Anus; *d* Bladder; *e* Symphysis.

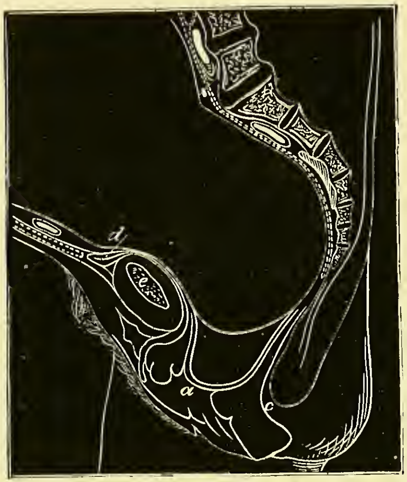

Fig. 41.

Relation of Peritoneum to Bladder during Parturition (*Braune*).

a Vagina; *d* Bladder; *c* Anus; *e* Symphysis.

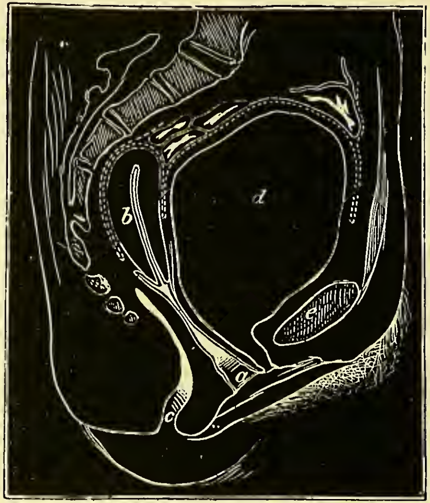

Fig. 42.

Relation of Bladder and Peritoneum when Bladder distended (*Pirogoff*).

a Vagina; *b* Uterus; *c* Anus; *d* Bladder; *e* Symphysis.

Although the pelvic peritoneum has been described in three sections, it must of course be kept in mind that it is a continuous membrane with no breaks in its continuity.

Some special facts about the peritoneum should now be noted.

Relation to Bladder and Rectum.

1. *As to the Bladder.*—Over the bladder and anterior abdominal wall, the peritoneum is easily separable. According to Spiegelberg, posteriorly it is closely blended with the uterus above the os internum, below this quite loosely attached. When the bladder is distended, the peritoneum is stripped off the lower part of the anterior abdominal wall to an extent varying with the distention (fig. 42). During parturition, the peritoneum is drawn off the bladder (fig. 41) (*Hart*).

2. *As to the Rectum.*—Its upper part is completely invested by peritoneum; the second part is only partially covered, *i.e.*, the peritoneum gradually leaves the rectum, quitting first the posterior surface, then the sides, and finally passing from the anterior surface on to the posterior vaginal wall.

See also Chapter II. on The Sectional Anatomy of the Female Pelvis, and especially Chapter III., p. 57.

Peritoneum in relation to operations.

Practical Points.—Although the vesico-uterine pouch can be reached by a transverse incision through the anterior fornix, it will not be cut into in operations on the anterior vaginal wall. In the upper third or so of the posterior vaginal wall the peritoneum may be opened into. This has indeed been done by the most skilful operators, but the risks attending it are not so considerable as usually alleged, especially when asepsis is secured. When the fingers are passed into the posterior fornix vaginæ, only about $\frac{1}{5}$ inch of tissue intervenes between them and the peritoneum. The possibility of there being a deep dip of the peritoneum, as shown at fig. 39, should not be forgotten in operations on the posterior vaginal wall.

CONNECTIVE TISSUE OF PELVIS.

By this we understand (I.) the Fascia described so elaborately by the human anatomist as the Pelvic Fascia; and (II.) the loose Connective Tissue padding the interstices between the muscles, lying round the cervix uteri, and spreading out beneath the pelvic peritoneum.

Pelvic Fascia.

I. The *Pelvic Fascia* of the anatomist is carefully described in the ordinary systematic and dissecting-room manuals, to which the student is therefore referred (*v.* also p. 8 and Chap. II.).

Pelvic Connective Tissue.

II. The *loose connective tissue* found lying subperitoneally, surrounding the cervix uteri and spreading out between the layers of the broad ligament, is of the highest importance pathologically, as in it and in the pelvic peritoneum occur those inflammatory exudations so common in women. Of late years our knowledge of the disposition of this tissue has been rendered much more accurate, and accordingly our discrimination of pelvic inflammatory attacks made much more precise.

Methods of studying it.

The distribution and relations of the pelvic connective tissue may be studied in various ways. The most valuable information is obtained by considering sections of frozen or spirit-hardened pelves. This gives the precise position of the tissue, its amount, and distribution. Another valuable method of investigation is to inject air beneath the peritoneum, between the layers of the broad ligament, and at other points. By this we learn the varying attachments of the pelvic peritoneum to the subjacent tissue, and the lines of cleavage, as it were, of the pelvic connective tissue along which pus will burrow. Instead of air we may inject plaster of Paris or water; plaster of Paris will be found the most useful.

We therefore consider—

a. Results obtained by the injection of water, air, plaster of Paris;
b. Results obtained by section.

a. Results obtained by injections of water, air, or plaster of Paris.

The best summary of these results is given by Bandl, to whom on this point we are indebted for much valuable information.

Connective Tissue investigated by injections.

König in his researches employed the bodies of women who had died a short time after labour from non-puerperal diseases, and injected air or water. The following briefly are his results:—

(1.) Water injected between the layers of the broad ligament, high up in front of the ovary, passed first into the tissue lying at the highest part of the side wall of the true pelvis. It then passed into the tissue of the iliac fossa, lifting up the peritoneum, and followed the course of the psoas, passing only slightly into the hollow of the iliac bone. Lastly, it separated the peritoneum from the anterior abdominal wall for some little distance above Poupart's ligament, and from the true pelvis below it.

(2.) On injection beneath the base of the broad ligament to the side and in front of the isthmus, the deep lateral tissue became filled first; then the peritoneum became lifted up from the anterior part of the cervix uteri. The separation passed thence first to the tissue near the bladder, and ultimately the fluid passed along the round ligament to the inguinal ring. There it separated the peritoneum along the line of Poupart's ligament, and passed into the iliac fossa.

(3.) An injection at the posterior part of the base of the broad ligament filled the corresponding tissue round Douglas' pouch, and then passed on as described at (1.).

Schlesinger has followed out these results in more elaborate researches.

b. Results obtained by section.

The Sectional Anatomy of the Pelvis has now become a subject of such importance that it demands consideration in a separate chapter. The student will find at pp. 46, 47, reference made specially to the distribution of the connective tissue.

CHAPTER II.

THE SECTIONAL ANATOMY OF THE FEMALE PELVIS.

LITERATURE.

Barbour, A. H. F.—Spinal Deformity in Relation to Obstetrics : W. & A. K. Johnston, Edinburgh, 1884. The Anatomy of Labour as exhibited in Frozen Sections : W. & A. K. Johnston, Edinburgh, 1889. *Braune*—Topographisch-anatomischer Atlas, Zweite Auflage : Veit & Co., Leipzig, 1872. *Dwight*—Frozen Sections of a Child : Wood & Co., New York, 1883. *Hart, D. Berry*—Atlas of Female Pelvic Anatomy : W. & A. K. Johnston, Edinburgh, 1884. Supplement to Atlas of Female Pelvic Anatomy : W. & A. K. Johnston, Edinburgh, 1884. *Legendre*—Anatomie Homolographique : Paris, 1868. *His*—Ueber Präparate zum Situs Viscerum, etc. : Arch. für Anat., 1878. Die Lage der Eierstöcke, Arch. für Anat. 1881. *Luschka*—Die Anatomie des menschlichen Beckens : Tubingen, 1864. *Pirogoff*—Anatome Topographica sectionibus per corpus humanum congelatum, etc. : Petropoli, 1859. *Ruedinger*—Topographisch-hirurgische Anatomie des Menschen : Stuttgart, 1873. *Simpson and Hart*—The Relation of the Abdominal and Pelvic Organs in the Female : W. & A. K. Johnston, Edinburgh, 1881. *Veit*—Die Anatomie des Beckens : Enke, Stuttgart, 1887. Pirogoff and Braune's Atlases are the great storehouse of Sectional Anatomy. Accounts of the method of freezing are given by Braune, Barbour, and Simpson and Hart.

WHILE dissections are valuable in ascertaining the anatomy of any region, it must be remembered that they involve displacement of relations and therefore may lead into error or exaggeration. These may be corrected and additional accuracy obtained by making sections of frozen bodies or parts of them. If a body or a pelvis be covered with mackintosh and embedded in a mixture of salt and finely pounded ice or snow, it will in three or four days become as firm and solid as marble, and may then be sawn in any direction necessary. Tracings of the sawn surface may be made while it is still frozen; and in this way an accurate and trustworthy drawing may be obtained on which valuable measurements can be made.

We have said that the sections may be sawn in any direction, but usually they are made in special and definite lines as follows :—

(1.) *Sagittal Mesial*, *i.e.* parallel to the sagittal suture so that the body or pelvis is divided into right and left halves ;

(2.) *Sagittal Lateral*, *i.e.* parallel and to one or other side of the sagittal mesial plane;

(3.) *Transverse or Horizontal*, *i.e.* at right angles to the long axis of the body, and with surfaces upper and lower;

PLATE I.

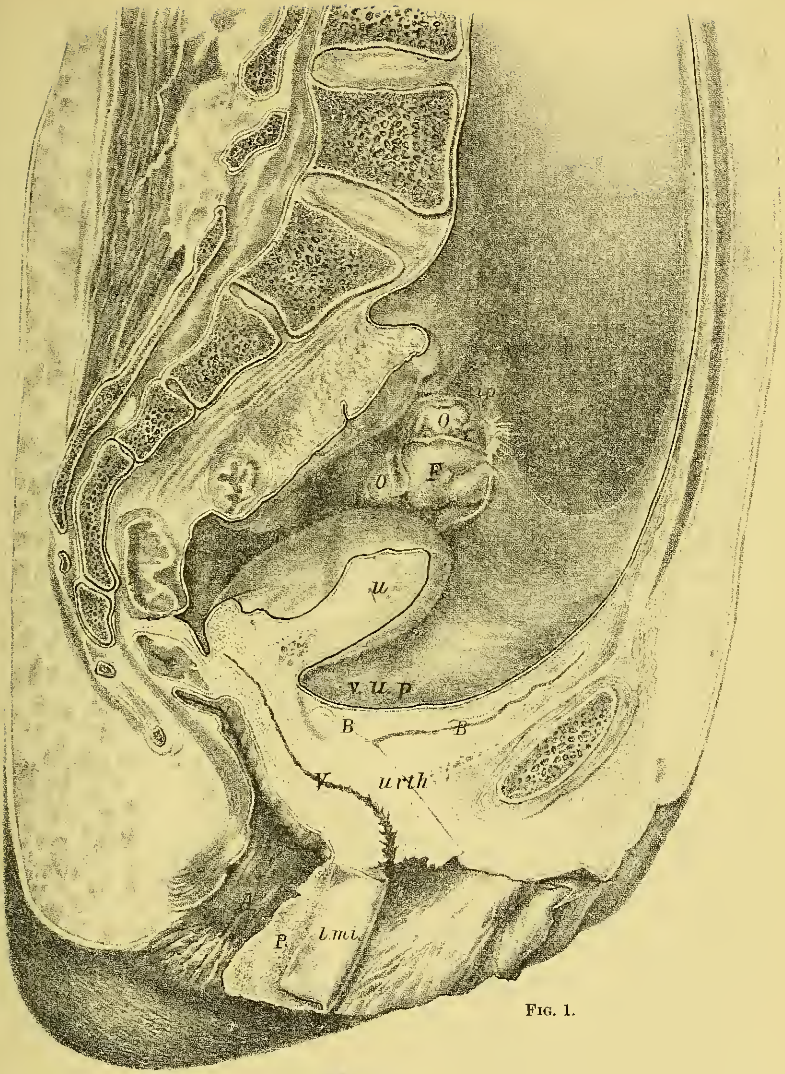

FIG. 1.

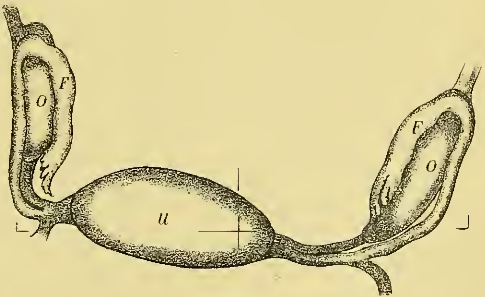

FIG. 2.

W & A K Johnston Edinburgh & Londo

POSITION OF UTERUS AND OVARIES.
FIG. 1. Sagittal Mesial Section of Pelvis (*Hart*).
FIG. 2. Fundus Uteri and Ovaries—Seen through the Pelvic Brim (*His*).

(4.) *Coronal, i.e.* parallel to the coronal suture dividing the body or pelvis into anterior and posterior portions with surfaces anterior and posterior;

In sections of the pelvis alone, the axis of the brim is taken instead of the long axis of the body. We have therefore the following:—

(5.) *Axial coronal, i.e.* a section cut parallel to the axis of the brim and from side to side, with sawn surfaces anterior and posterior;

(6.) *Axial transverse, i.e.* at right angles to the axis of the brim and with surfaces therefore upper and lower.

We now take up the consideration of certain special sections.

1. *Sagittal Mesial Section.*

Sagittal Mesial Section.

Plate I., fig. 1, shows a frozen sagittal mesial section of the pelvis with the uterus in position, the bowel and bladder naturally empty and the small intestine removed from the pouches so as to display the Fallopian tube and ovary. This section brings out the following facts: the uterus is not mesial but displaced somewhat to the left; the empty bladder is Y-shaped in sagittal mesial section; the urethra, vagina, and rectum are nearly parallel to one another and to the conjugate of the brim; the anus cuts these axes at right angles. The intestines have been removed from the Pouch of Douglas and vesico-uterine pouch. The nearness of the anterior abdominal wall to the promontory of the sacrum is well shown. The Perineal body is seen in section, and it should be noted that the greater part of it lies below the Hymen. Those Gynecologists who exaggerate its functions usually draw it as being entirely behind the lower part of the posterior vaginal wall. Plate I. and fig. 23 shows that it does not do this. The student should note the peritoneal relations.

Plate I. also shows the relations of the Fallopian tube and ovary. When freshly cut, the intestines filled the peritoneal cavity; but after the section had been hardened in spirit, these were carefully lifted out so as to expose the ovary and Fallopian tube. The ovary lies with its long axis vertical, as His has pointed out. The preparation bears out his views completely with regard to the position of the ovaries, for on the other side of the body the ovary had its long axis somewhat transverse; and he has found that when the uterus was laterally displaced the ovary of the side towards which the uterus was displaced lay vertical while the other ovary was somewhat transverse. In this cadaver the uterus lay to the left side and it is the left ovary which has its long axis vertical. The Fallopian tube does not form a loop enclosing the ovary as His found in his specimens (Plate I. fig. 2).

2. *Sagittal Lateral Section.*

Sagittal Lateral Section.

By this section a specially valuable view is obtained. Fig. 43 shows a drawing of a section at the junction of the uterus and broad ligaments; in it, although the pubes is divided mesially, the pelvic contents are cut to one side of the mesial plane. It should be noted that the amount of retropubic tissue is less than in the sagittal mesial one; that at the junction of the broad ligaments with the uterus there is a large amount of tissue with large blood-vessels; and specially that the finger placed in the lateral fornix vaginæ touches the base of the broad ligament there.

Connective Tissue of Broad Ligaments.

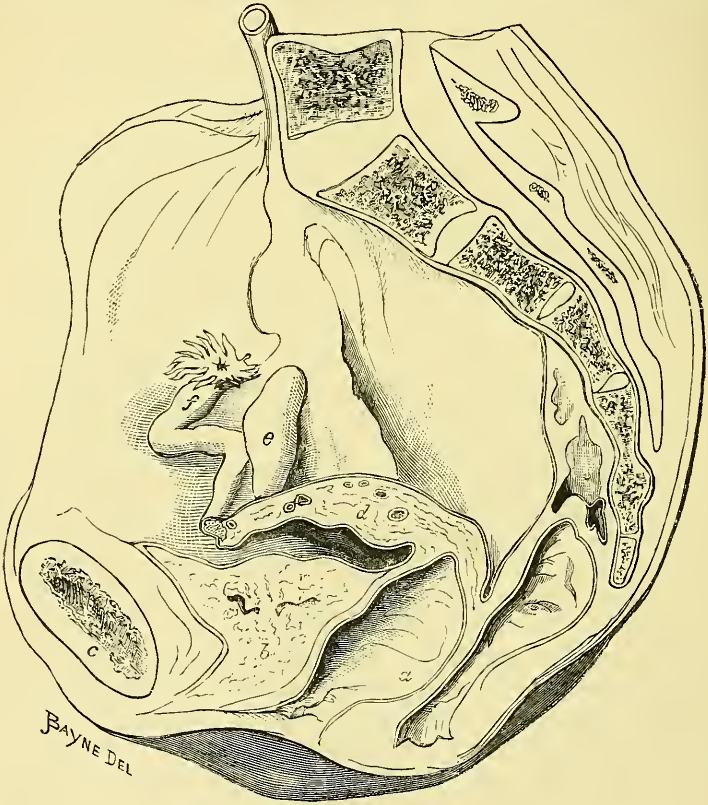

Fig. 43.

Sagittal Mesial Section of Pelvis cutting at Junction of Broad Ligament and Uterus. *a* Vagina with its walls separated; *b* Bladder; *c* Symphysis; *d* Broad ligament; *e* Ovary; *f* Fallopian Tube. In this specimen the Uterus was laterally displaced.

This fact is valuable as to diagnosis. On section, the boundaries of the space between the broad ligaments are seen: superiorly the cut section of the Fallopian tube, anteriorly and posteriorly the peritoneum, and inferiorly the vaginal fornix. The assertion by Guérin and Le Bec as to the insignificance of the tissue here is not borne out.

Sections made nearer the side pelvic wall display specially the lessen-

PLATE II.

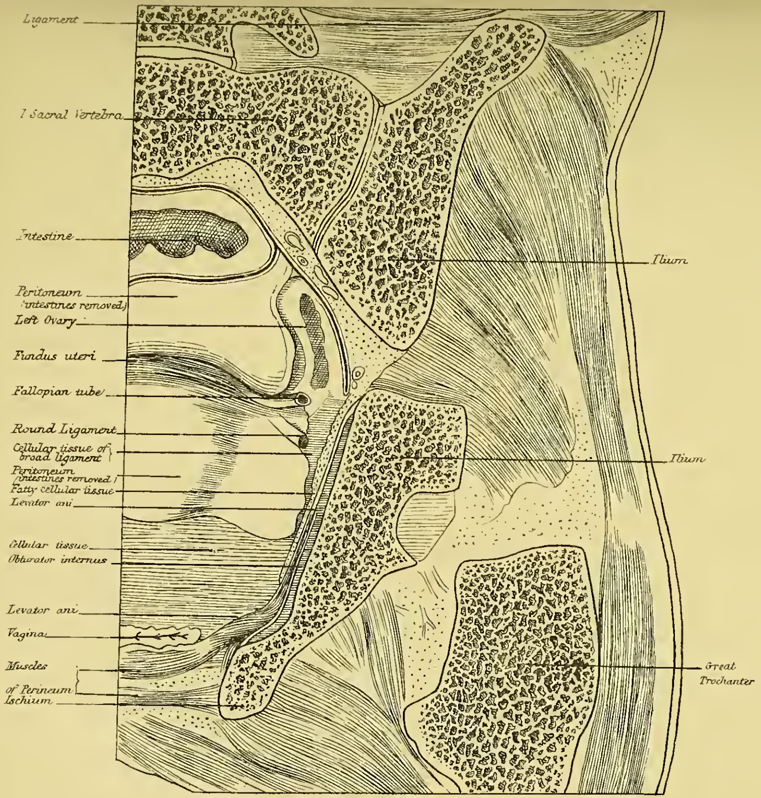

FIG. 1.

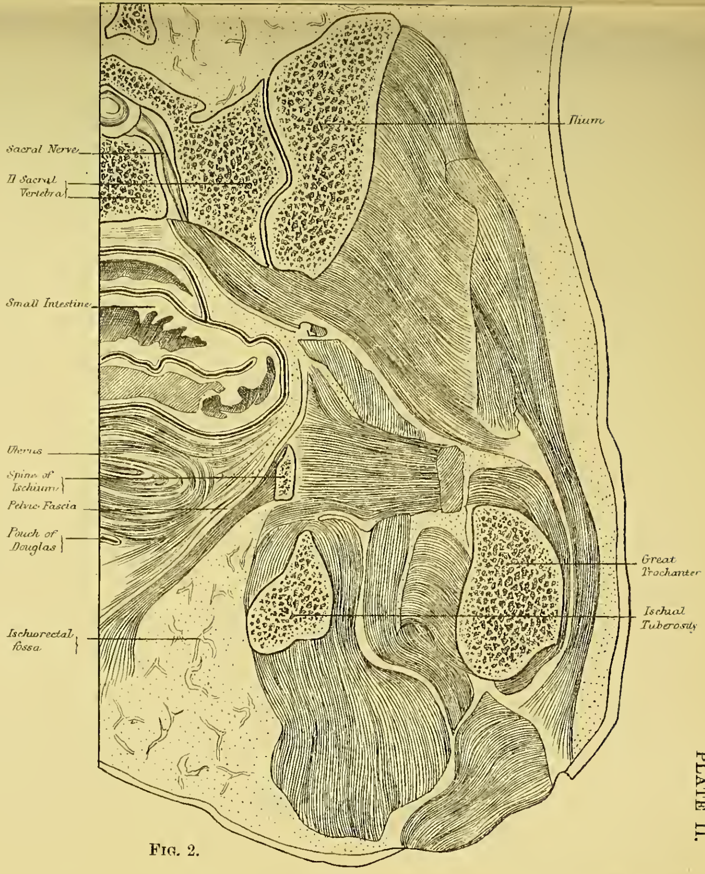

FIG. 2.

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CORONAL SECTIONS OF LEFT HALF OF PELVIS—Seen from the front *(Barbour)*.

ing tissue between the layers of the broad ligaments and show sections of the ovary.

3. *Transverse or Horizontal Section.*

Pelvic Connective Tissue—as seen in Horizontal Section.

These give results confirming those above stated. Pirogoff gives several sections in his Atlas, but these are not clearly defined in their connective-tissue relations. Freund has published a very valuable series of preparations in his recently issued gynäkologische Klinik. The most valuable sections are those at the level of the supra-vaginal portion of the cervix, which show the tissue lying here all round it. In fig. 44 we show a section from Ruedinger, where the retropubic fat and ischiorectal cavities are well shown.

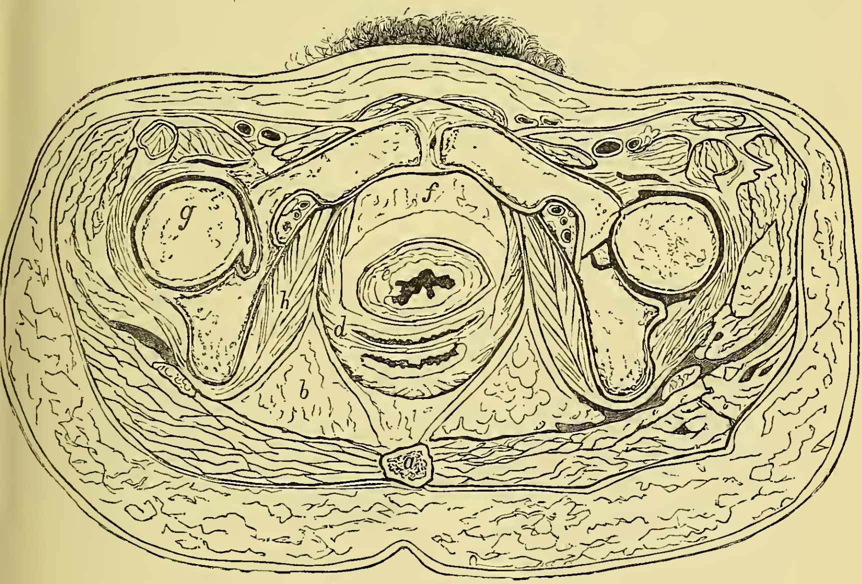

Fig. 44.

Transverse Section of Female Pelvis at plane of Hip-Joints (*Ruedinger*).
a Coccyx; *b* Ischiorectal fossa; *c* Rectum; *d* Vagina; *e* Bladder; *f* Retropubic fat; *g* Hip-joint.

Parametric Tissue.

This is the best place to draw special attention to what Virchow first termed the parametric tissue. By this term he meant the loose fatless tissue (·8 in. thick), with abundant blood-vessels and lymphatics, surrounding "the lower portion of the uterus and the upper portion of the vagina" (*Spiegelberg*). This is the parametric tissue proper. Some extend the meaning of the term parametric tissue so as to include all the connective tissue in the pelvis.

4. *Coronal Section.*

Coronal Section.

Plate II. fig. 1, shows a coronal section of the pelvis passing through the base of the sacrum and the great trochanter. We note that the sacro-iliac joint runs from above downwards and inwards. The body of the sacrum bulges downwards, and the ischial tuberosity projects inwards so that the side wall of the pelvis is not straight: both of these are abnormalities. The anterior portion of the sacro-sciatic notch is seen.

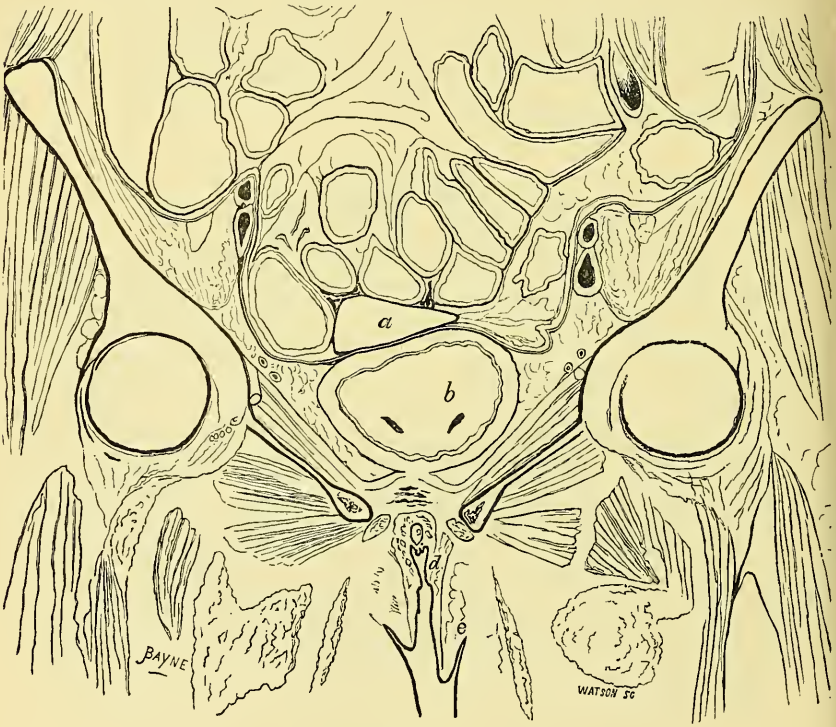

Fig. 45.

Coronal Frozen Section of Pelvis (*Ruedinger*).

a Fundus uteri; *b* Bladder; *d* Labium minus; *e* Labium majus.

The levator ani is seen arising from the pelvic fascia over the obturator internus, and passing down to be inserted into the perineal body. The muscles of the perineum are also exposed. The body of the retroverted uterus is seen in great part, and lies perpendicular to the horizon; the frozen intestines have been removed so as to expose the fundus; the left Fallopian tube and round ligament have been divided as they pass forwards from the uterus. The left ovary has been partially cut across, and the removal of the intestines has exposed it entirely. Some cellular

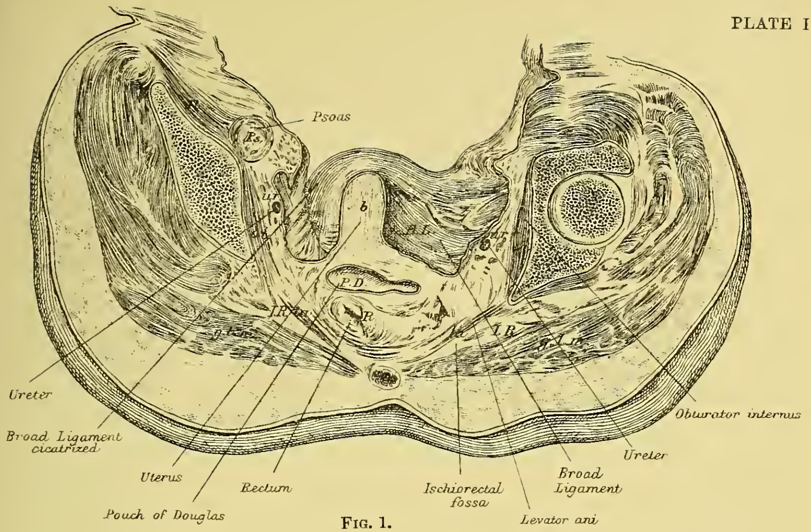

FIG. 1.

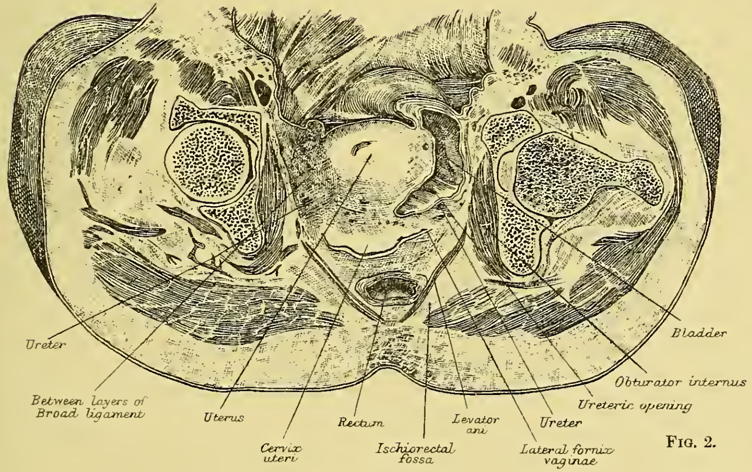

FIG. 2.

AXIAL CORONAL SECTIONS OF PELVIS—Seen from behind (*Hart*).

W & A K Johnston, Edinburgh & London

tissue is also exposed in the broad ligament; and there is some fatty cellular tissue external to this and continuous with the sub-peritoneal fatty tissue which lies external to the ovary and in the region of the sacro-sciatic notch. The uterus in this cadaver lay perpendicular to the horizon, and the ovary has the vertical position already described as a common one. The connective tissue between the bladder and the rectum is well seen as also its continuity with that in the broad ligament. This section explains clearly how a cellulitis when suppurated may open into the vagina or pass through the sciatic notch to the hip. The levator ani and transversus perinei ending in the perineal body are clearly seen.

This section of the sacral plane does not show the bite or joggle described by Matthews Duncan; but it is well seen in the next figure.

Plate II. fig. 2, shows a coronal section $\frac{3}{4}$ inch behind the preceding. In the bony pelvis we note, as has been said, that the sacro-iliac joint shows the bite or joggle. The spine of the ischium has been divided where it gives origin to the levator ani; the tuberosity is cut through in its posterior part, where it gives origin to the muscles. The levator ani is seen arising from the ischial spine and passing downwards to be inserted into the rectum at the external sphincter. External to it lies the ischio-rectal fossa, which extends upwards as far as the ischial spine; internal to it, a well-marked layer of the pelvic fascia is displayed. The uterus has been sliced across from the ovarian ligament to below the utero-sacral ligament; the intestines seen above it occupy the highest part of the pouch of Douglas. The peritoneum of the pouch of Douglas has been cut across in two places,—where it covers the body of the uterus about the level of the ovarian ligaments, and also 1·3 cm. ($\frac{1}{2}$ in.) above the bottom of the pouch of Douglas.

We observe in this section the boundaries of the ischiorectal fossa, and the continuity of the tissue in the broad ligament with that in front of the sacrum.

At fig. 45 is shown the relations of the pelvic organs in Ruedinger's coronal section of a female cadaver. The complete section is given in Plate V. and will be referred to when we have to consider the relations of the organs with regard to the examination of the abdomen.

5. *Axial Coronal Section of Pelvis.*

Axial Coronal Section.

Plate III. fig. 2, is an axial coronal section made $1\frac{1}{2}$ inch behind the pubes and passing through the hip joints. This pelvis was not normal, as there was a cellulitis of the left broad ligament and a displacement of the bladder to the right side. The section is viewed from behind. Owing to a slight distention of the bladder the uterus lay in the axis of the brim and has been divided coronally. The left broad ligament has been divided similarly so that its side relations to the obturator internus are displayed. The vagina is a crescentic slit, the side limits of the vaginal portion of the cervix being marked *x x*. The levatores ani are seen springing from the pelvic fascia and curving downwards and inwards below the rectum. We see that here the boundaries of the ischiorectal fossa are gluteus maximus, below; levator ani, above and to the inner side; and obturator internus, above and to the outer side. On the right side, the ureter has been cut as it lies in the bladder wall: it lies $\frac{7}{8}$ inch from the vagina. On the left side it is about one inch from the vagina. This section exhibits the side relations of the broad ligament, the continuity of the connective tissue between the layers of the broad ligament with that in front of the iliacus muscle, and the accurate packing, as it were, of the abdominal viscera.

Pl. III. fig. 1, gives a section similar in direction to the preceding, but about one inch farther back so that it grazes the posterior surface of the uterus.

The Pouch of Douglas is cut into at one part. The left broad ligament is shortened by the cellulitis already mentioned. The ischiorectal fossa is seen at its most posterior part and is very small, being roofed in by the levator ani and its floor being formed by the gluteus maximus. The divided ureters are seen lying in the loose fatty tissue outside the broad ligaments.

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CHAPTER III.

THE POSITION OF THE UTERUS AND ITS ANNEXA, AND THE RELATION OF THE SUPERJACENT VISCERA.

LITERATURE.

Bandl—Ueber die normale Lage und das normale Verhalten des Uterus und die pathologisch-anatomischen Ursachen der Erscheinung Anteflexio: Arch. f. Gynäk., Bd. XXII., S. 408. *Braune*—Topograph. Anatom. Atlas, Zweite Auflage: Leipzig, Veit & Co., 1872. *Claudius*—On the Position of the Uterus: Med. Times and Gazette, 1865, p. 5. *Credé*—Beiträge zur Bestimmung der normalen Lage der gesunden Gebärmutter: Archiv f. Gynäkologie, Bd. I., S. 84. *Foster*—A Contribution to the Topographical Anatomy of the Uterus and its Surroundings: Am. J. of Obst. XIII., p. 30. *Hart, D. B.*—Atlas of Female Pelvic Anatomy: W. & A. K. Johnston, Edinburgh, 1884. See also Supplement to Atlas. *Hasse*—Beobachtungen über die Lage der Eingeweide im weiblichen Beckeneingange: Archiv f. Gynäk. Band viii., S. 402. *His*—Ueber Präparate zum Situs Viscerum u.s.u.: Arch. für Anat., 1878., S. 53. And Die Lage der Eierstöcke in der weiblichen Leiche: Arch. für Anat., 1881, S. 398. *Pirogoff*—Anatome Topograph. etc.: Petropoli, 1859. *Sappey*—Traité d'Anatomie Descriptive: Paris, 1873. *Schroeder*—Handbuch der Krankheiten der weiblichen Geschlectsorgane: Leipzig, 1879. *Schultze*—Die Pathologie und Therapie der Lageveränderungen der Gebärmutter; Berlin, 1881. *Symington, J.*—The Topographical Anatomy of the Child: Edinburgh, Livingstone, 1887. An admirable account of the subject will be found in Van de Warker's articles on a study of the Normal Movements of the Unimpregnated Uterus: N. Y. Medical Journal, XXI., p. 337. And on the Normal Position and Movements of the Unimpregnated Uterus: Am. J. of Obst., Vol. XI., p. 314.

The amount of literature, chiefly French and German, on this subject is much too extensive even to be mentioned here, for the position of the uterus has given rise to much discussion. This is partly due to the inherent difficulty of accurate clinical observations, to the erroneous opinions advanced by many eminent anatomists, and to arbitrary demands as to the normal uterine position made by gynecologists with strong opinions on anteversion.

Difference in opinions as to position of Uterus.

Thus, in the well-known works of Braune, Luschka, Cruveilhier, and Henle, the uterus is figured from actual sections as normal with the fundus in the hollow of the sacrum, *i.e.*, retroposed. Claudius of Marburg, also an anatomist, is uncompromising on this point. He states, indeed, that the uterus is normal only when, with its broad ligaments, its posterior surface touches the sacrum as closely as the lungs do the ribs (fig. 46). Now, almost all gynecologists agree, from clinical observation, that the body of the uterus lies over on the bladder, with the os uteri looking more or less back. This divergence of opinion is extraordinary; and it leads to this interesting practical observation, that what the anatomist considers a uterus normal in position, the gynecologist believes to be abnormal. That is, the retroverted uterus—considered normal in cadavera by the anatomist—is, when found in the living subject, replaced by the gynecologist so that it lies with its body over the bladder.

There can be no doubt that the uterus lies normally to the front with its anterior surface resting on the bladder. Great refinement is exercised, quite unnecessarily, by many gynecologists in settling what they believe to be the exact angle which the long axis of the uterus should make with the horizon, when a woman is in the erect posture; and this refinement has been greatly stimulated by the mechanical treatment of what is known by many as anteversion of the uterus.

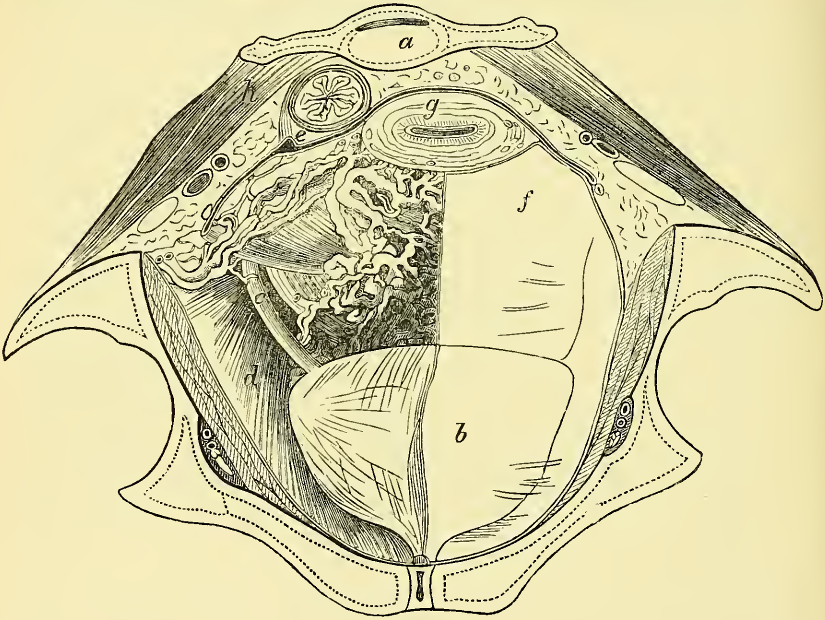


Fig. 46.

Transverse Section of Pelvis in line of Pyriform Muscles (*Luschka*). The Peritoneum has been removed on the right side. *a* 3d Sacral Vertebra; *b* Bladder; *c* Ureter; *d* Levator Ani; *e* Rectum; *f* Anterior Layer of Broad Ligament; *g* Uterus; *h* Pyriform Muscle. Note that here the uterus is retroverted, and the pouch of Douglas without intestine.

In treating of this vexed question, we shall consider—

1. The normal form and position of the uterus;
2. The local divisions of the pelvic-floor peritoneum as viewed through the pelvic brim, and the position of the uterus and its annexa;
3. The physiological changes in the position of the uterus;

4. The relation of the small intestine to the pelvic floor and to the uterus and its annexa.

THE NORMAL FORM AND POSITION OF THE UTERUS.

Normal form of Uterus.

The question of the *form* of the uterus we consider only in the limited aspect of the angular relation of the long axis of the uterus to the long axis of the cervix. These are not in the same straight line, but, when the bladder and rectum are empty, lie at an obtuse angle of varying value. This angle is more open in multiparous women (fig. 25), than in nulliparæ (fig. 47).

The question as to whether in the normal uterus the cervix and body are in the same straight line or meet at an angle opening anteriorly, is much disputed and by no means easy to settle. Bimanually, the normal uterus is fairly often found anteflexed, but the question arises whether the Bimanual examination has not brought about or at any rate exaggerated the anteflexion. Bandl asserts that when the uterus is removed and examined *post mortem*, anteflexion is rarely found, the normal uterine axis being straight. It should be remembered however that the removal of the uterus from the body involves the cutting of the utero-sacral ligaments and the absence of intra-abdominal pressure, *i.e.*, removes the

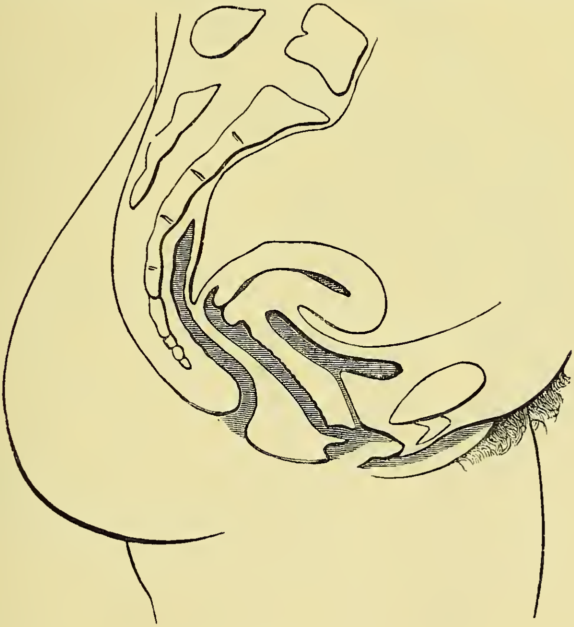


FIG. 47.

DIAGRAM to show Normal Form and Position of VIRGIN UTERUS (*Schultze*).

conditions in the living subject which keep up "physiological anteflexion"; so that a uterus somewhat anteflexed during life may be straightened by removal *post mortem.* The best way to ascertain the existence of anteflexion in the living woman is to use simple vaginal examination. The question really is as to the normal form of the uterus in the living woman with the peritoneal folds intact and intra-abdominal pressure in action. Under these conditions there is a normal degree of anteflexion which is called "Physiological anteflexion," in contrast with Schultze's "Pathological anteflexion," so commonly caused by utero-sacral cellulitis (*v.* also chap. on Displacements of the Uterus).

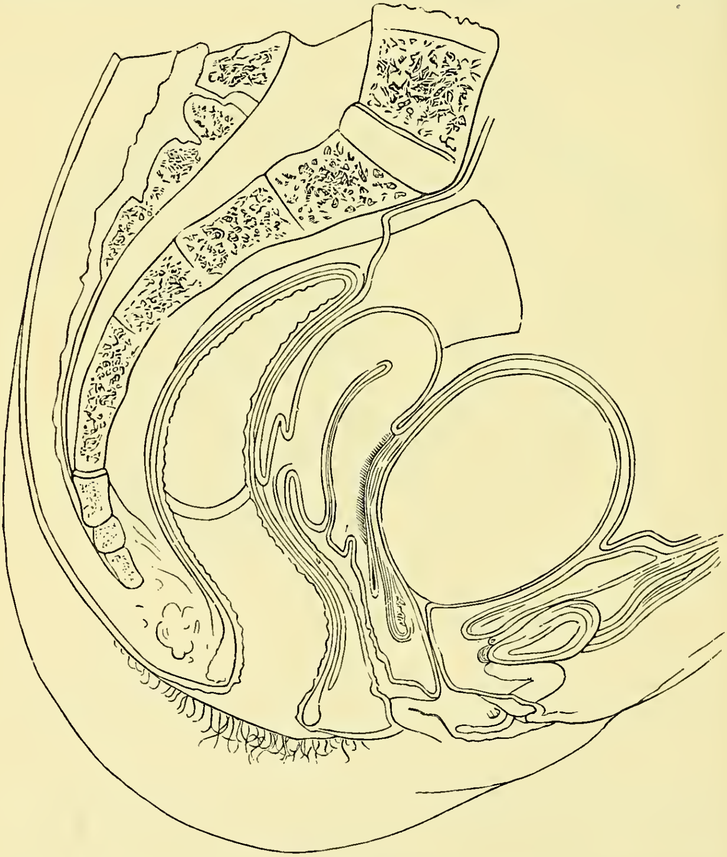


FIG. 48.

SECTION OF PELVIS, showing UTERUS driven back by distended Bladder, and Peritoneum disturbed (*Kohlrausch*). *This is not a normal condition of parts by any means.*

Normal position of Uterus.

The *position* of the uterus, with empty bladder and rectum, is such that it lies with its anterior surface touching the posterior aspect of the bladder, no intestine usually intervening; the os externum uteri looks downwards and backwards: and the uterus is slightly twisted as a whole on its long axis, so that the uterine end of the right Fallopian tube is nearer the symphysis than that of the left. We have expressly said with bladder and rectum empty. According to Schultze, the long axis of the uterus is nearly parallel to the horizon. This is probably exaggerated, as Schultze's researches were conducted in a way that certainly anteverted the uterus unduly (figs. 25 and 47). Many authors figure the uterus nearly vertical to the horizon, for this purpose distending the bladder until the uterus is elevated to what they consider the proper angle (fig. 48). It is needless to say how absurd this is. Kohlrausch's

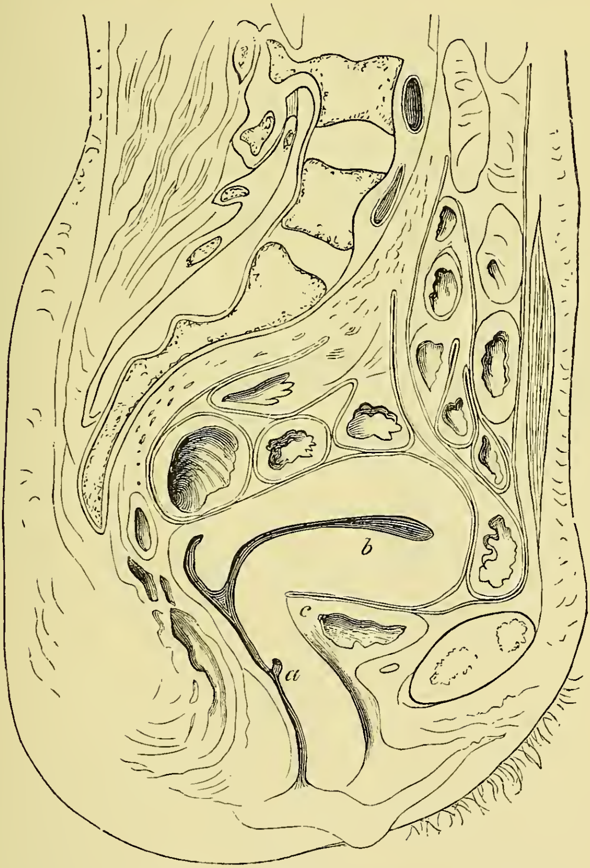


FIG. 49.

SECTION of FEMALE CADAVER (*Pirogoff*).
a Vagina; *b* Uterus; *c* Bladder.
Note Bladder in diastole, Uterus parallel to horizon, and shallow dip of Douglas' Pouch.

diagram, so often quoted in support of this allegation, really shows, if it show anything, the position of the uterus when the bladder is well distended. The student should note this point, as Kohlrausch's section is the favourite diagram of those who treat as pathological what is really a normal uterus. Fig. 49, from Pirogoff, shows a frozen section supporting Schultze's contention.

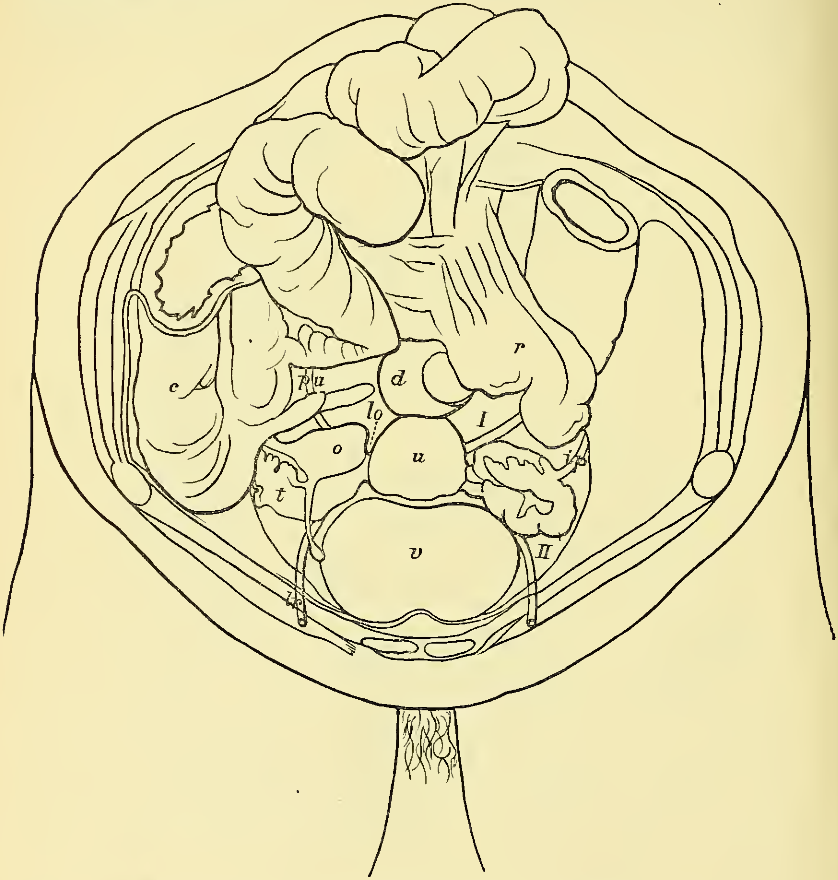


Fig. 50.

Female Pelvis and Contents viewed through the Pelvic Brim (*Hasse*).
v Bladder; *II.* Paravesical Pouch; *u* Uterus; *o* Ovary; *t* Fallopian Tube; *d* Pouch of Douglas; *I* Lateral Pouch of Douglas; *i p* Infundibulo-pelvic Ligament; *l r* Round Ligament; *p u* Position of Ureter; *l o* Ovarian Ligament; *r* Rectum; *c* Colon.

It is important to know how results as to the uterine position have been obtained. The chief methods are as follows:—

Methods of investigating position of Uterus.

(1.) *By frozen, spirit-hardened, or chromic-acid sections.* — Results obtained in this way are valuable, if we make allowance for some *post-mortem* change in the uterine position not yet thoroughly understood.

(2.) *By the bimanual examination of the pelvic contents.*—This is probably the best method, although it exaggerates the normal anteversion of the uterus in a way that will be readily understood when the chapter on the Bimanual has been studied.

(3). *By the use of the sound*, or by a more elaborate means described by Schultze. Space does not permit of a full description of the latter, but a good account of it is given in Foster's paper.

THE LOCAL DIVISIONS OF THE PELVIC-FLOOR PERITONEUM AS VIEWED THROUGH THE PELVIC BRIM, AND THE POSITION OF THE UTERINE ANNEXA.

For valuable papers and sections on this subject, we are indebted to Hasse of Breslau, Ruedinger of Munich, and His of Leipzig (fig. 50 and Plate V.). Hasse froze not quite thoroughly a female cadaver in the upright posture, cut through the abdomen transversely, and then lifted out the softened viscera until the pelvic contents were exposed undisturbed. The bladder was moderately distended.

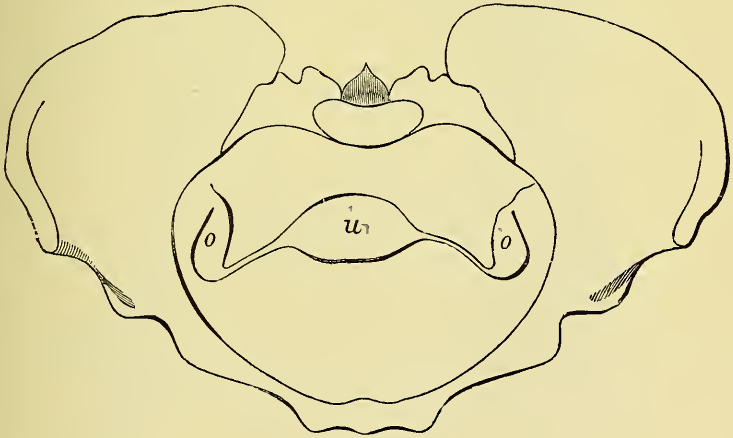


Fig. 51.
Position of Fundus Uteri and lie of Ovaries. Bladder distended (*Schultze*).

Pelvic Contents as seen through the Brim.

Fig. 50 shows Hasse's drawing. The fundus of the uterus lying on the bladder is well seen. In front of the broad ligament—of which the infundibulo-pelvic ligament is the only portion visible in fig. 50—we have, on each side, the paravesical pouch of the peritoneum. Behind it, lies the lateral pouch of Douglas; while just behind the uterus and bounded on each side by the utero-sacral ligament is the pouch of Douglas proper. The Fallopian tubes lie in the true pelvis, in the paravesical pouch. Each broad ligament sweeps outwards and backwards to near the sacro-iliac synchondrosis of its own side. The position of the ureter is well indicated.

Direction of Ovaries.

According to Hasse the long axis of each ovary runs outwards and forwards, forming with the transverse axis of the uterus an angle open to the front. Part of each ovary (the half) projects above the plane of the pelvic brim. Schultze figures the ovaries as having their long axes almost antero-posterior (fig. 51), and His in his cases found the long axes nearly vertical. In recent sections, the authors found the ovary lying nearly vertical as His describes (*v.* Pl. I.). The long axis of the ovary on the side to which the uterus is displaced is nearly vertical, while the ovary of that side from which the uterus is displaced is more transverse (*v.* page 22, and Pl. I., fig. 2).

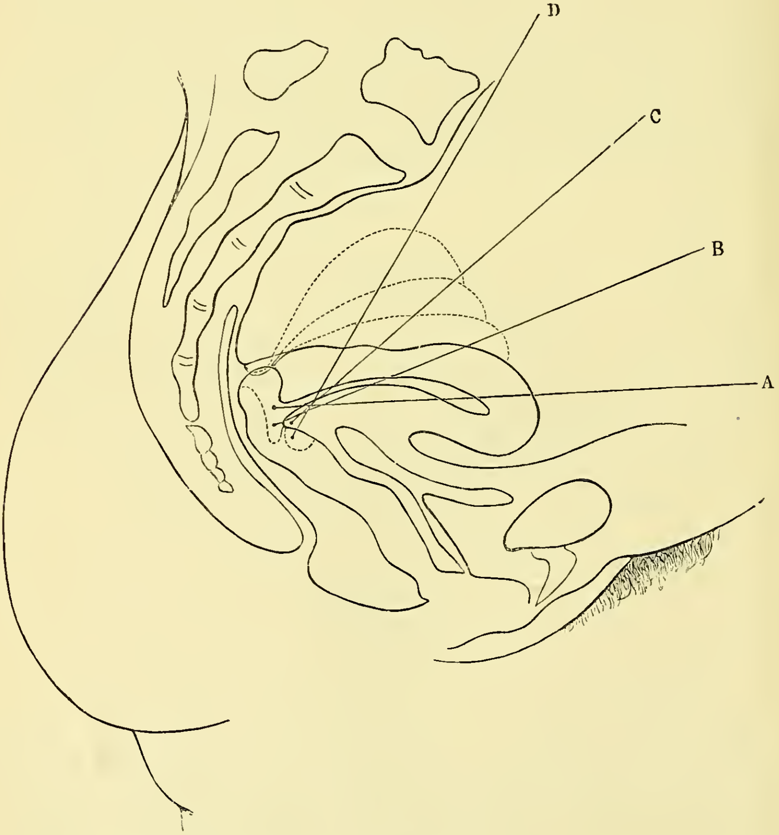
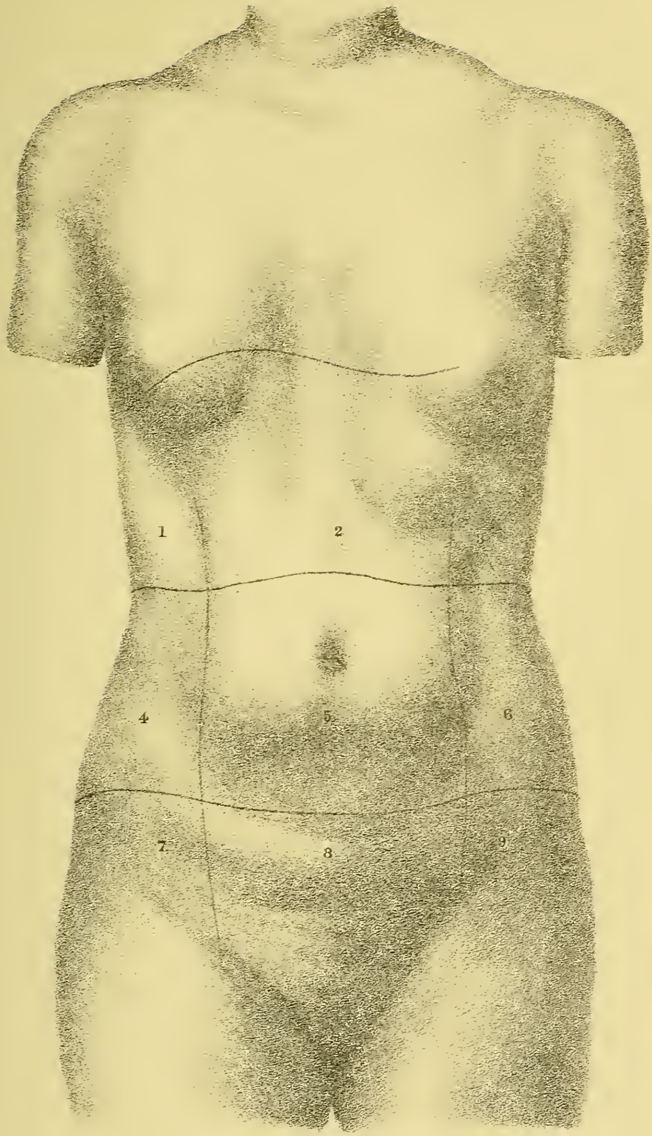


Fig. 52.
Position of Uterus. *A* with bladder and rectum empty; *B*, *C*, *D* according to distention of bladder (*Van de Warker*).

THE PHYSIOLOGICAL CHANGES IN THE POSITION OF THE UTERUS.

The mobility of the uterus is one of its most characteristic features. With every movement of respiration, in singing, in walking, and in

PLATE IV.



W. & A. K. Johnston Edinburgh & London

SURFACE-VIEW OF ABDOMEN AND THORAX; THE SECTION IS SEEN AT PLATE V.

1. Right Hypochondriac.
2. Epigastric.
3. Left Hypochondriac.
4. Right Lumbar.
5. Umbilical.
6. Left Lumbar.
7. Right Iliac.
8. Hypogastric.
9. Left Iliac.

The uppermost line indicates the position of the Diaphragm.

PLATE V.

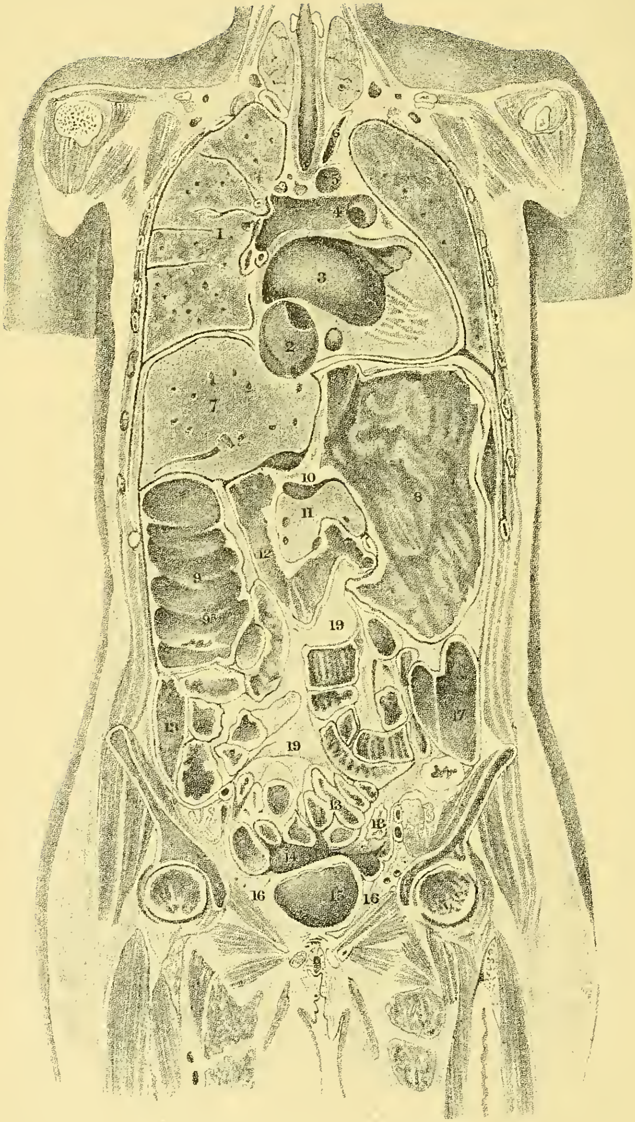


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PLATE V.—CORONAL SECTION OF FROZEN FEMALE CADAVER (*RUEDINGER*).

all violent movements, the uterine position is changed. Van de Warker has studied, in a valuable paper, the influences bringing about these changes in position; this may be consulted for details of his method of investigation and results obtained.

Effect of Bladder on position of Uterus.

Of the greatest importance is the effect of the distended bladder on the uterine position. As the bladder fills, the uterus becomes retroposed to an extent shown at figs. 48, 51, and 52. The intestines are forced out of the upper part of Douglas' pouch, and the height of the peritoneal reflection from the anterior abdominal wall is considerably increased. All these points are well illustrated by fig. 42 from Pirogoff. As the urine is evacuated, the uterus passes forward to its normal anteverted condition and the intestines pass back into Douglas' pouch. Probably, undue distention of the bladder leads to permanent retroversion in some cases, especially if the uterus be gravid. Rectal distention displaces the uterus forwards and to the right side.

THE RELATION OF THE SMALL INTESTINE TO THE PELVIC FLOOR AND TO THE UTERUS WITH ITS ANNEXA.

Relation of small Intestines to Uterus.

The small intestine lies resting on the uterus, ovaries, Fallopian tubes, and broad ligaments. There is usually no small intestine in the vesico-uterine pouch. *When the bladder is empty and the unimpregnated uterus to the front, there is small intestine in Douglas' pouch except at its very lowest part.* The pouch of Douglas becomes emptied of intestine as the bladder distends, and has no intestine in it when the uterus is retroverted. Many authors assert that there is never small intestine in Douglas' pouch. This opinion is undoubtedly wrong, as any one can satisfy himself by studying sections. Often Douglas' pouch contains serum, and this displaces the intestine. Figures 36, 42, 50, bear out these opinions; fig. 45 and Plate V. should be carefully studied as illustrating the position of the superjacent intestines. The paravesical pouch probably contains intestine when the uterus lies to the front, and certainly contains it when the uterus is pathologically retroverted. Occasionally, the omentum may interpose between the small intestine and the pelvic viscera.

To sum up briefly :—

Summary as to position of Uterus.

a. The uterus and bladder behave practically as one organ *quâ* position (*i.e.*, they move together), when the uterus is to the front.

b. The exact angle which the uterus makes with the horizon cannot be fixed, and knowledge on this point is not necessary.

c. The uterus lies normally to the front, but has a range of mobility indicated in fig. 52. The posterior lip of the cervix is ·6 to 1·2 in. (1·5 to 3 cm.) above the tip of the coccyx. By digital pressure the uterus can be elevated about 1½ in. (4 cm.).

CHAPTER IV.

THE STRUCTURAL ANATOMY OF THE FEMALE PELVIC FLOOR: THE PELVIC-FLOOR PROJECTION.

LITERATURE.

STRUCTURAL ANATOMY. *Hart*—The Structural Anatomy of the Female Pelvic Floor: Edinburgh, 1881. Atlas of Female Pelvic Anatomy: 1884. Supplement to ditto: 1885. W. & A. K. Johnston, Edinburgh and London. *Symington*—A Contribution to the Normal Anatomy of the Female Pelvic Floor: Edin. Med. Jour., March, 1889.

PELVIC-FLOOR PROJECTION. *Foster*—Topographical Anatomy of Uterus, etc.: Am. J. of Obst., XIII., p. 30. *Schrœder*—Noch ein Wort über die normale Lage und die Lageveränderungen der Gebärmutter: Arch. f. Gynäk., Bd. IX., S. 68. *Schultze*—Zur Kenntniss von der Lage der Eingeweide im weiblichen Becken: Archiv f. Gyn., Bd. IX., S. 262. *Simpson and Hart*—The Relation of the Abdominal and Pelvic Organs in the Female: W. & A. K. Johnston, Edinburgh and London, 1881.

THE STRUCTURAL ANATOMY OF THE FEMALE PELVIC FLOOR.

Structure of Pelvic Floor with regard to function.

HITHERTO we have regarded the pelvic floor in detail as made up of bladder, vaginal walls, rectum, connective tissue, and peritoneum. In this chapter we purpose considering it in its structural aspect. In its formation, the following functions have been provided for. As compared with the floor of the male pelvis, the female pelvic floor differs in having in it the cleft known as the vagina. Then further, women have to undergo parturition in which the child is born through the vagina, which is then greatly distended. At the same time a woman has resting on her pelvic floor the same abdominal viscera as the male, and her pelvic floor is also subjected to the same strain from intra-abdominal pressure. Thus we have to explain how the female pelvic floor has been constructed so as to allow of parturition and the rectal and vesical functions and yet remain strong enough to resist ordinary intra-abdominal pressure. The question is a *structural* or architectural one. We study it in this present chapter just as we should study the structure of a box or chair.

In order to understand this question, we must study the pelvic floor as seen both in *sagittal mesial* and in *axial coronal section.*

a. Sagittal Mesial Section.

Its appearance in Sagittal Mesial Section.

In this view (*cf.* Pl. I.) we see the pelvic floor or diaphragm stretching from symphysis pubis to sacrum. The anus is to be imagined closed as in life. The first thing to note is the vagina, which is seen as a cleft running upwards in the pelvic floor from hymen to cervix uteri. Its walls are in close apposition (*vide* figs. *passim*). They are often erroneously represented apart; in order, as it were, to let the student *see* the vagina. This is wrong, however. It is no more necessary to figure the vaginal walls always apart, than it would be always to sketch a man with his mouth open to render it visible. The first idea one gets on looking at a frozen section is that, owing to the apposition of the vaginal walls, the pelvic-floor is unbroken; and that the vaginal cleft, the introduction of which does weaken the floor somewhat, cuts it not perpendicularly to the horizon but obliquely at an angle of about 60°.

The pelvic floor, as seen in this section, is made up of two segments which are known as the *pubic* and *sacral* segments. It is of importance to define these exactly.

The Pubic Segment.

The *Pubic Segment* is made up of loose tissue, viz., bladder, urethra, anterior vaginal wall, and bladder-peritoneum. It is attached in front to the symphysis pubis. This attachment is a loose one; the bladder and urethra, meeting one another at right angles, are separated from the pubes by the pyramidal deposit of loose fat already described as the retropubic fat deposit. Note specially that the retropubic fat deposit as seen in this section—that of a subject in the dorsal or the erect posture—is triangular; and that the peritoneum passes from the anterior abdominal wall on to the fundus of the bladder, just a little above the top of the symphysis. Below the pubic arch, the urethra becomes blended with the perineal muscles there.

The Sacral Segment.

The *Sacral Segment* is attached to the coccyx and sacrum; it consists of rectum, perineum, posterior vaginal wall, and strong tendinous and muscular tissue. The inferior portion of this segment, the perineum, lies about 1½ inches from the symphysis.

In addition to the retropubic fat deposit, it should be noted that—

a. The posterior wall of the bladder is *loosely* attached to the anterior vaginal wall;

b. The urethra and anterior vaginal wall are *closely* blended;

c. The posterior vaginal wall and anterior rectal wall are *loosely* connected, as far down as the apex of the perineal body (fig. 33).

The Segments contrasted.

The two segments, as seen in sagittal mesial section, are thus *anatomically* contrasted:—

The pubic segment is made up of loose tissue, and is loosely attached to the pubic symphysis; the sacral segment is made up of dense tissue and is firmly dovetailed into the sacrum and coccyx.

They are further contrasted *functionally*:—

The pubic segment is drawn up during labour; the sacral segment is driven down.

The proof of this functional contrast is too elaborate to be given here, but will be found in detail in Hart's Atlas. Briefly stated it is that during labour the pubic and sacral segments as seen in a sagittal mesial section may be likened to two folding doors. Uterine action pulls up the pubic segment, and drives the child down against the sacral one. This action is analogous to the way one passes out through two folding doors, when he pulls the one door towards him and pushes the other from him. As the result of this elevation of the pubic segment, the bladder is drawn above the pubes and its peritoneum stripped off (fig. 53).

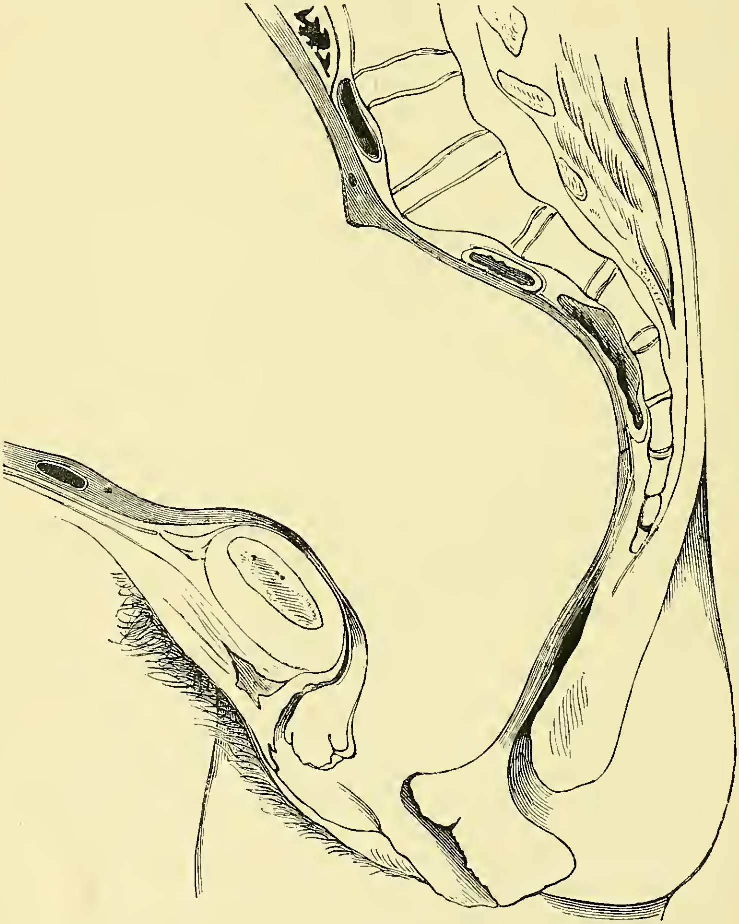


FIG. 53.

PELVIC FLOOR differentiated in parturition (*Braune*). The Pubic Segment is drawn up and the Sacral one driven down. Note position of bladder and its peritoneum : for lettered description, see fig. 41.

Displacement of the Public Segment.

The various components of the pubic segment are definitely displaced in its movements. Thus the retropubic fat is—

1. Behind the pubes in the nonparturient female (fig. 49);
2. Above it in the parturient female (fig. 53);
3. Below it in prolapsus uteri;
4. Below it in the extra pelvic-floor projection of pregnancy;
5. Partially above the symphysis in the genupectoral posture (fig. 60).

The peritoneum is—

1. Reflected on to the top of the empty bladder in the nonparturient female;
2. Stripped off the bladder during parturition;
3. Reflected on to fundus of empty bladder, at a higher level above symphysis, in the genupectoral posture.

Thus the peritoneum over the bladder is movable; the peritoneum over the sacral segment is fixed.

b. Axial Coronal Section.

Axial Coronal Section.

If now we study axial coronal sections, we shall find these views (based on sagittal mesial) both enlarged and modified. If actual sections such as are shewn in Pl. III., figs. 1 and 2, be examined it will be found that, owing to the presence of loose tissue, a line of cleavage runs within the obturator internus, upper part of the levator ani, and rectum, separating these structures from the vagina. We thus find a complete ring of loose tissue of which part has been seen in sagittal mesial section and part in axial coronal section. This ring of loose tissue runs as follows:—beginning behind the pubes (retropubic fat), it passes on the internal aspect of the obturator internus and upper portion of Levator ani of the left side; between the posterior vaginal and anterior rectal walls; on the inner aspect of the obturator internus and upper portion of the Levator ani of the right side; and then back to the retropubic fat. This ring of loose tissue divides the pelvic floor into two portions:—

a. The entire displaceable portion;
b. The entire fixed portion.

a. The entire displaceable portion comprises bladder, urethra, and vaginal walls. It has resting upon it the uterus, broad ligaments, Fallopian tubes, and ovaries; and lies within the ring of loose tissue.

b. The entire fixed portion lies outside of the ring of loose tissue. If the entire displaceable portion were cut out of the pelvic floor, then on looking through the pelvic brim, we should see, *in front*, the posterior aspect of the pubes, sloping downwards and backwards; *at the sides*, the inner aspects of the obturator internus sloping downwards and inwards; and *behind*, the anterior rectal wall and sacrum sloping downwards and forwards. We should, in fact, be looking down into a funnel whose walls all sloped towards a central point. This funnel forms the entire fixed portion of the pelvic floor.

It will now be understood that the entire fixed portion supports the entire displaceable portion; and that consequently on these two combined (*i.e.*, the whole pelvic floor) the uterus and annexa and the abdominal viscera rest.

Divisions of Pelvic Floor.

The terminology given need not confuse if it be remembered that the terms 'pubic segment and sacral segment' apply to sagittal mesial sections only, and are applicable to the mechanism of parturition; while 'entire displaceable and entire fixed portions' apply to transverse sections, and are to be used for the general physics of the pelvic floor and for prolapsus uteri. The relation between the two views given by sagittal mesial section and by transverse (or by axial coronal) section may be represented as follows:—

Sagittal Mesial Section.		*Transverse or Axial Coronal Section.*
Pubic Segment.	Bladder and urethra,	Entire displaceable portion.
	Anterior vaginal wall,	
Sacral Segment.	Posterior vaginal wall,	
	Tissue attached to sacrum,	Entire fixed portion.
	Bowel in pelvic floor,	
	All outside of inner aspects of levator ani.	

Functions of Pelvic Floor.

The chief functions demanded of the female pelvic floor are—

a. Support of Intra-abdominal Pressure,
b. Vesical and rectal functions,
c. Parturition.

a. Support of Intra-abdominal Pressure. The abdominal and pelvic viscera rest on the pelvic floor; more correctly, these viscera (along with the entire displaceable portion of the pelvic floor) rest on the entire fixed portion of the pelvic floor, the inward convergence of whose parts enables them to support these. Prolapsus uteri is thus, as we shall afterwards see, not a mere uterine descent, but a downward displacement of the abdominal and pelvic viscera along with the entire displaceable portion of the pelvic floor.

b. Vesical and rectal functions. The loose tissue round the rectum and bladder allows of the contraction and diminution in bulk of these organs which are necessary for the expulsion of their contents.

c. Parturition. This is the great function of the pelvic floor, and is provided for structurally as follows. The child is driven through the vagina (*i.e.* through the entire displaceable portion) by the upward tension of the uterine muscle attached to the top of the vaginal walls and by the dilating pressure of the fœtal head. This upward movement of the entire displaceable segment is allowed by the ring of loose tissue of which we have spoken. We are now able to understand the full significance of the statement already made that the pubic segment of the pelvic floor is pulled up partly into the abdominal cavity while the sacral segment is driven downwards and backwards. In addition, the levatores ani will be pressed outwards.

The result of parturition is (1) To dilate the vaginal walls and render them more easily everted, (2) to tear the inferior margin of the sacral segment, *i.e.* the perineum, (3) to elongate and slacken the ring of loose tissue uniting the entire displaceable and the entire fixed portions. In this way, it favours that driving downwards and outwards of the entire displaceable portion which happens in Prolapsus uteri.

PELVIC-FLOOR PROJECTION.

Definition of Pelvic Floor Projection.

By this is understood the amount of projection of the pelvic floor, in sagittal mesial section, *beyond the straight line joining the tip of the coccyx and the subpubic ligament—i.e., beyond the conjugate of outlet* (fig. 54).

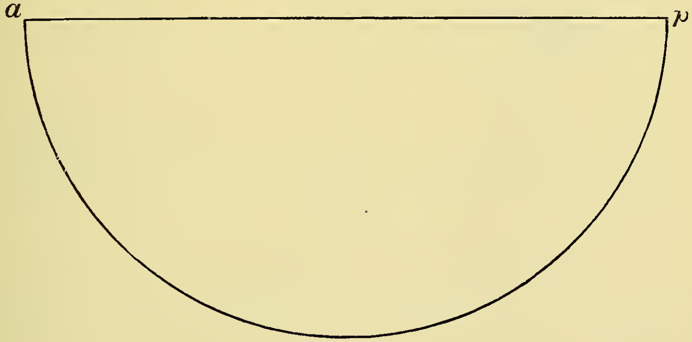


Fig. 54.

Diagram to show what is meant by Pelvic-Floor Projection. $a\,p$=conjugate of outlet. A perpendicular bisecting $a\,p$ and cutting the arc gives the greatest pelvic-floor projection (*F. P. Foster*).

Definite results have not as yet been obtained, but this is one special reason why attention should be directed to it.

Schroeder measured the conjugate at the outlet with callipers; and then passed a measuring line from the coccyx to the apex of the pubic arch, the tape following the curve of the pelvic floor. The subjoined table gives some of his results.

	Distance from tip of coccyx to lower border of symphysis.	
	By Tape Measure.	By Callipers.
Average of the pregnant woman	cm. 13·35	9·15
,, ,, gynecological patients	,, 12·6	8·27
,, ,, nulliparæ	,, 13·2	9·75

Schroeder's deduction is that the average projection of the pelvic floor beyond the plane of the pelvic outlet is 4·1 cm. There is no doubt that this is an excessive average.

Mode of measuring pelvic-floor projection.

F. P. Foster of New York has written ably on this subject, and made a large series of observations. Fig. 55 shows the callipers he employed. The ends of the limbs (*a* and *b*) are placed on the tip of the coccyx and lower border of the symphysis pubis, respectively. The horizontal bar between these limbs is graduated in cm., and the limb (*a*) glides along it in a groove. A movable upright (*c*), also graduated, has its upper point placed against the most projecting part of the pelvic floor. If now the whole apparatus be removed and laid flat on a sheet of paper, the conjugate and amount of projection can be read off at once. Greater accuracy is ensured by noting, before removing the apparatus, the point on the transverse bar at which the upright (*c*) stands as well as the reading which it gives.

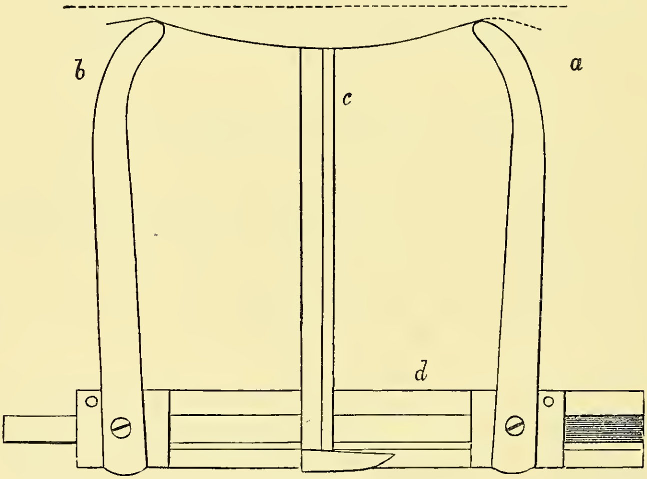


FIG. 55.
CALLIPERS for measuring PELVIC-FLOOR PROJECTION (*Foster*).

Foster's average (2·5 cm.) of the pelvic-floor projection is less than

Schroeder's. He placed the patient semiprone, however; a position in which the pelvic-floor projection is slightly diminished. Fig. 56 shows Foster's diagram of pelvic-floor projection. The uterus is more anteverted than in Foster's original drawing.

Measurements made on frozen sections must be used with caution. Schroeder has justified his average by such measurements, but has taken no account of the existence of pregnancy in some of the cases.

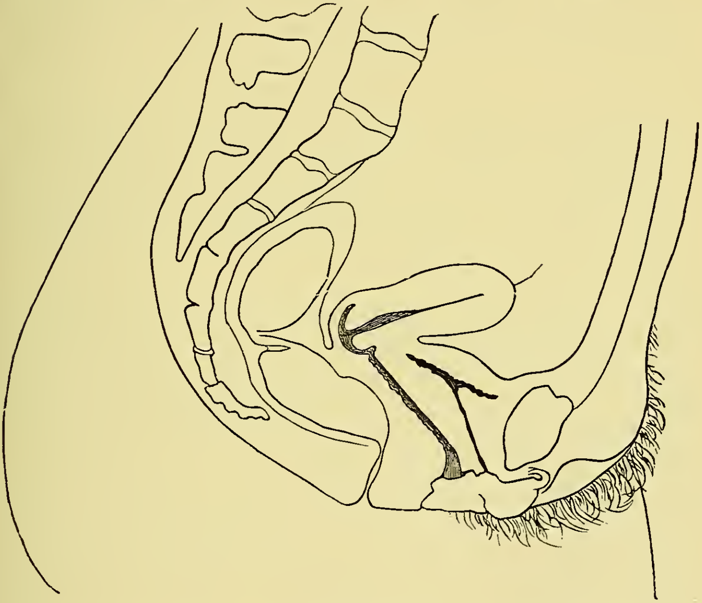


FIG. 56.

DIAGRAM OF PELVIC-FLOOR PROJECTION and position of uterus, modified from *Foster*. The anterior and posterior walls of the anus are not in apposition, as shown in the diagram.

We might tentatively advance the following statements :—

Summary as to pelvic-floor projection.

(1.) The pelvic-floor projection is over-estimated by Schroeder;

(2.) Foster's average is nearer the mark;

(3.) The retropubic fat gives a rough index of the position of the pubic segment (figs. 39, 40, 47);

(4.) The pelvic-floor projection is increased by advanced and even by early pregnancy (Braune's Plates).

The whole inquiry needs further investigation in order to settle also other points, among which we may mention the relation of the vagina to the pelvic outlet and the varying amount of pelvic-floor projection in different postures.

CHAPTER V.

THE BLOOD-VESSELS, LYMPHATICS, AND NERVES OF THE PELVIS: DEVELOPMENT OF PELVIC ORGANS.

LITERATURE.

BLOOD-VESSELS. *Henle*—Handbuch der Eingeweidelehre des Menschen: Braunschweig, 1866. *Hyrtl*—Die Corrosions-anatomie und ihre Ergebnisse: W. Braumüller, Wien, 1873. *Klein and Smith's* Atlas. *Luschka*—Die Musculatur am Boden des weiblichen Beckens: Wien, 1861. *Quain*—Anatomy, 8th Ed.: London, 1882. *Sappey*—Traité d'Anatomie Descriptive: Paris, 1873. *Savage*—Female Pelvic Organs, 5th Ed.: London, 1882. *Tait, Lawson*—The Pathology and Treatment of Diseases of the Ovary, p. 8.: Birmingham, 1883. *J. Williams*—On the Circulation in the Uterus, with some of its Anatomical and Pathological Bearings: Obstet. Soc. of London, 1885.

LYMPHATICS. *Bourgery and Jacob*—Traité Complet de l'Anatomie de l'Homme: Paris, 1839. *Championniére*—Lymphatiques Utérines et Lymphangite Utérine: Bull. de la Soc. Med. des Hôpitaux de Paris, Vol. VII. *Curnow*—The Lymphatic System and its Diseases: Lancet, 1879. *Klein*—The Anatomy of the Lymphatic System: London, 1873. *Le Bec*—Contributions à l'Etude des Ligaments larges, etc.: Gaz. Heb., 15 Avril 1881. *G. Leopold*—Die Lymphgefässe des normalen nicht schwangeren Uterus: Archiv für Gynäk., Bd. VI., S. 1. *W. T. Lusk*—Puerperal Fever: International Congress Tr., Philad., 1877. *Sappey, Savage*—Op. cit.

NERVES.—*T. Snow Beck*—The Nerves of the Uterus: Phil. Tr., 1846. *Flower*—Diagrams of the Nerves of the Human Body: J. and A. Churchill, London, 1872. *Frankenhäuser*—Die Nerven Der Gebärmutter und ihre Endigung in den glatten Muskelfasern: Jena, 1867. *Jastrebow*—On the normal and pathological Anatomy of the ganglion cervicale uteri: Lond. Obstet. Trans., 1881. *R. Lee*—The Anatomy of the Nerves of the Uterus: London, Bailliére, 1841. *Tiedemann*—Tabulæ Nervorum Uteri: Heidelberg, 1822.

DEVELOPMENT OF THE PELVIC ORGANS. *Foulis*—The Development of the Ova, and the Structure of the Ovary in Man and the other Mammalia: Tr. R. S., Edin., Vol. XXVII. *Klein and Smith, Quain, Turner*—Op. cit.

BLOOD-VESSELS.

Preliminary Remarks:—The blood supply to the pelvic organs and perineum is derived from the ovarian arteries (which are branches of the abdominal aorta), and from the uterine, vaginal, and internal pudic arteries (which are all branches of the anterior division of the internal iliac).

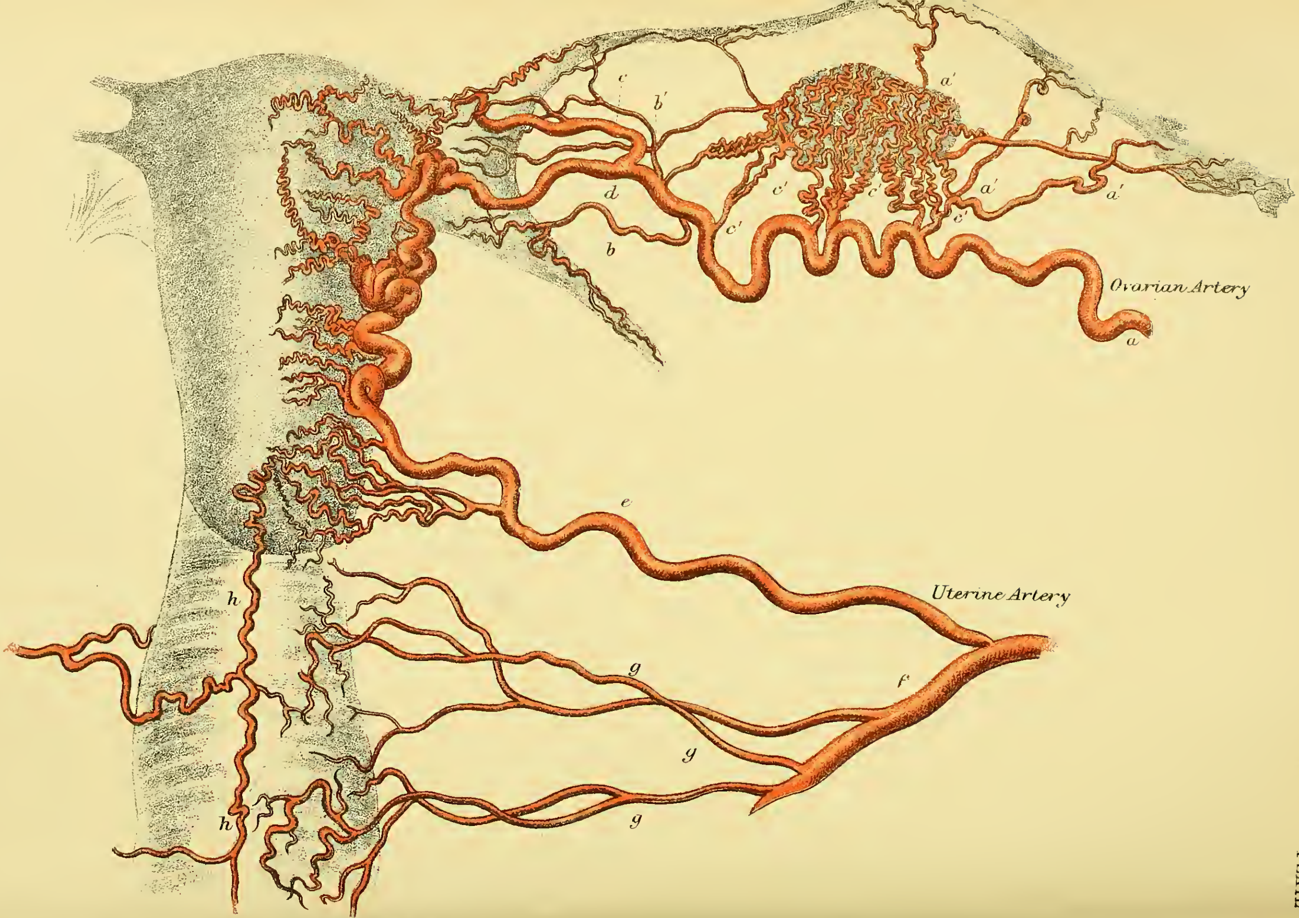
We shall first consider the arterial supply of the uterus, ovary, Fallopian tubes, vagina, bladder, rectum, and that of the perineal region; and then the venous distribution.

ARTERIAL SUPPLY.

Arterial supply to Uterus and Ovary.

(1.) *Arterial supply to uterus, ovary, etc.*—The *Ovarian artery* of each

PLATE VI



DISTRIBUTION OF OVARIAN, UTERINE, AND

side (corresponding to the spermatic of the male) is a branch of the abdominal aorta. Its relations when in the abdomen do not concern us here. In the pelvis it passes between the layers of the broad ligament, running tortuously towards the upper angle of the uterus. Near this it divides into two branches. The upper supplies the fundus uteri; the lower anastomoses at the side of the uterus with the uterine artery (Plate VI. *c*, *d*).

The Ovarian Artery gives off—

Branches to the ampulla of the Fallopian tube (Plate VI. *a′ a′*),
Branches to the isthmus (*b′*),
Numerous branches to the ovary (*c′ c′ c′*),
Branch to the round ligament (*b*).

The *Uterine Artery* (Plate VI. *e*) springs from the anterior division of the internal iliac, and passes downwards and inwards towards the cervix uteri. It then passes upwards between the layers of the broad ligament by the side of the uterus, in an exceedingly tortuous manner well shown in Plate VI., to anastomose with the lower branch of the ovarian. The course of the blood-vessels in the uterine wall has been recently studied and described by J. Williams with special reference to some anatomical and pathological points. The primary branches after entering the uterine tissue have a somewhat superficial course, being separated from the peritoneum by only a thin layer of muscular fibres. From these, secondary branches run towards the mucous surface in a direction perpendicular to that surface; these anastomose freely and end in capillary loops in the mucous membrane. All internal to the primary branches—the greater part of the muscular wall—belongs, according to Williams, to the mucous membrane, *i.e.*, is muscularis mucosæ. The *Vaginal arteries* (*g g g*) usually spring immediately from the anterior division of the internal iliac artery, but sometimes arise from the uterine or middle hæmorrhoidal. A special branch of the uterine artery to the cervix joins with its fellow at the isthmus to form the circular artery, and with those of the vagina to form the azygos artery of the vagina (*h h*). The vaginal arteries of one side anastomose freely with those of the other. Plate VI., from Hyrtl, illustrates beautifully the free anastomosis of branches of the aorta with the ovarian, uterine, and vaginal arteries. It should be noted that, in operation for removal of the uterus, ligature of the broad ligament controls all hæmorrhage.

From the same anterior division of the internal iliac proceeds the blood supply to the bladder and rectum.

Arterial supply of Perineum.

Arterial supply to the perineal region.—This comes from the internal pudic. The superficial perineal branch supplies the labia; the artery to the bulb supplies the bulbus vaginæ; the terminal branches go to the clitoris.

VENOUS SUPPLY.

Veins of Pelvis.

The venous supply of the pelvis is very abundant, and exists in the form of numerous plexuses freely communicating with one another. The veins are unprovided with valves; hæmorrhage from a wound is therefore often exceedingly profuse, especially during pregnancy when the whole pelvic vascular system is hypertrophied.

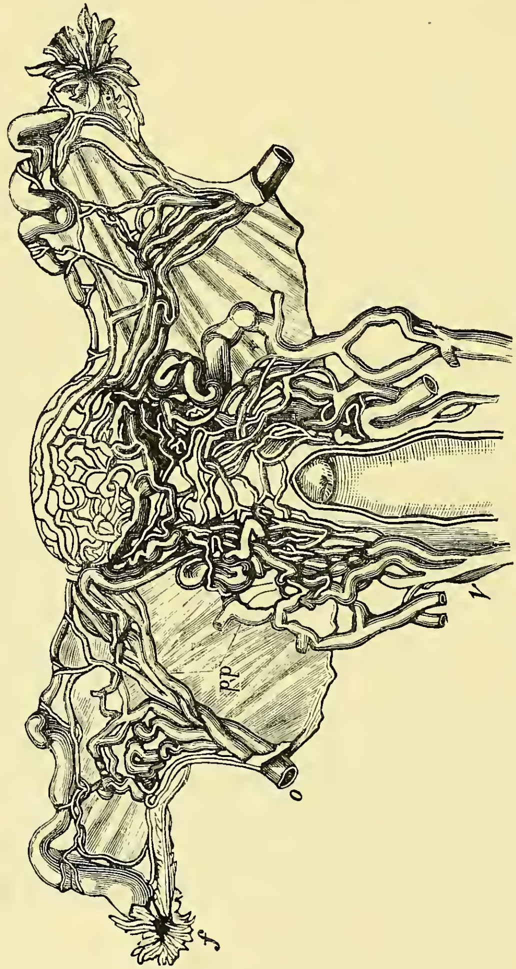


Fig. 57.

Uterus and Vagina with their venous supply, seen from behind—(*Luschka*). *f* Fallopian tube; *pp* pampiniform, *o* ovarian, *v* vaginal plexuses.

The following is a summary of the main facts as to the venous supply of the female pelvis.

The *Vesical plexus* lies external to the muscular coat of the bladder. The *Hæmorrhoidal plexus* lies below the mucous membrane of the lower part of the rectum.

The veins of the *labia* correspond in distribution to the arteries, and those from the outermost parts drain into the pudic which opens into the common iliac vein. Large veins from the labia minora open into the pars intermedia of the bulb.

The veins from the *glans* and *corpus clitoridis* pass into the dorsal vein of the clitoris, which communicates with the vesical plexus.

The veins of the *bulb* pass into the vaginal plexus.

The *Vaginal plexuses*—one outside the muscular coat and one in the submucous tissue—are most abundant at the lower part of the vagina, communicate with the hæmorrhoidal and vesical plexuses, and open into the internal iliac vein.

The *Uterine plexus* is very abundant, as is well shown in one of Hyrtl's plates; it ultimately opens into the ovarian veins (fig. 62), which pass on the right side to the inferior vena cava, on the left to the left renal vein. The right ovarian vein has a valve where it pierces the coat of the inferior vena cava (*Brinton*, quoted by Lawson Tait). The veins are small, lie in the outer muscular coat, and run longitudinally; in the middle layer of that coat they open into large sinuses (surrounded by circular unstriped muscle) with which the capillary vessels communicate. This is an arrangement like that in the corpus spongiosum of the penis (*Klein*).

The *Ovarian plexus*, otherwise known as the pampiniform plexus, lies between the folds of the broad ligament and communicates with the uterine plexus (fig. 57). Some apply this term to all the veins in the broad ligament. The ovarian plexus opens into the inferior vena cava. Just at the hilum of the ovary lies the collection of veins known as the bulb of the ovary.

Beneath the peritoneum and between the layers of the broad ligaments are vast venous plexuses. Knowledge on this point is of the highest importance in relation to pelvic hæmatocele.

The vesical, hæmorrhoidal, and vaginal plexuses, with the pudic veins, open into the internal iliac vein which joins the inferior vena cava.

From the hæmorrhoidal plexus, the superior hæmorrhoidal vein passes into the portal system; and thus we get a communication between the pelvic and portal venous systems.

In the vaginal mucous membrane, clitoris and uterus, we have erectile tissue, *i.e.*, veins in connective tissue with unstriped muscular fibre.

LYMPHATICS.

Under this we take up—

a. The Lymphatic glands;
b. The Lymphatic Vessels.

Lymphatic Glands.

a. The Lymphatic Glands.—These are (1.) the *inguinal glands*, which lie parallel to and just below Poupart's ligament; and (2.) the *pelvic glands.* These latter consist of the following:—

(*a*) A gland at the isthmus uteri (*Championnière*);
(*b*) Hypogastric glands, which lie subperitoneally in the space between the external and internal iliac vessels;
(*c*) Sacral, on the lateral aspect of the anterior surface of the sacrum and in the mesorectum; and
(*d*) A gland or collection of small glands at the obturator foramen—the obturator gland of Guérin.

These all pour into the lumbar glands, which lie in front of the lumbar vertebræ and discharge into the thoracic duct.

Lymphatic Vessels of External Genitals,

b. The Lymphatic Vessels. (1.) *Of External Genitals.*—Numerous vessels form a network on the internal aspect of the labia majora, over the labia minora, and round the vaginal and urethral orifices, vestibule, and clitoris; all of these open into the inguinal glands. From this arrangement, the enlargement of the inguinal glands in syphilis and vulvar cancer is intelligible. The lymphatics of the *lower fourth of the vagina* also open into these glands.

Of Vagina,

(2.) *Of Vagina* (*upper three-fourths*) *and Cervix Uteri*—These lymphatics open into the hypogastric glands.

So far we have followed Sappey's description. Le Bec, however, asserts that the lymphatics of the vagina pour into a series of trunks at the level of the isthmus uteri, and that those of the cervix join them; and that the conjoined lymphatics then pass below the base of the broad ligament to the obturator gland, from which vessels communicate with others from the thigh and even from the epigastrium.

The relation between lymphatics and glands is as follows:—

(*a*) Those of the external genitals pass into the inguinal glands;

(*b*) The lymphatics of the bladder, vagina, and cervix pass to the hypogastric glands (*Sappey*). According to Le Bec, they pass to the obturator gland.

Of Uterus.

(3.) *Of Uterus.*—The lymphatics of the body of the uterus pass through the broad ligaments; and, along with those from the ovary and Fallopian tube, enter the lumbar glands. If Le Bec be right, the lymphatics from the cervix pass *below* the broad ligament and those from the uterus along the *upper* part of the same. Some of the uterine lymphatics pass along the round ligament to the groin.

Leopold, who has investigated the lymphatics in the unimpregnated uterus, considers "the mucous membrane of the uterus as a lymphatic surface which contains no special lymphatic vessels, but consists of lymph sinuses covered with endothelium.

"The lymph passes from the lymphatic spaces of the mucous membrane, through the mucous membrane hollows, into the lymph spaces and vessels of the muscular coat, surrounds here all the bundles up to the serous covering, and flows into the larger vessels which enter the broad ligament in the neighbourhood of the blood-vessels" (*loc. cit.*, S. 31).

These are matters not of mere anatomical detail, but of the very highest pathological and practical importance. The richness of blood and lymphatic supply to the vagina, cervix, and uterus explains the extraordinary rapidity with which septic matter spreads through the body, and the extreme danger which may attend even an insignificant lesion of the internal genital organs, when septic matter is present and is absorbed. We may remark here that septic matter will of course follow the lymphatic routes already laid down, and that bacteria can penetrate the walls of blood-vessels and pass into the general circulation. It should not be forgotten, however, that the bacteria passing along the lymphatic vessels may penetrate them, pass into the peritoneal cavity, and thence spread through the diaphragm to set up the pleurisy and pericarditis so common in septicæmia (*Lusk*). Thorough comprehension of lymphatic distribution and knowledge of the evil effects of septic matter are of the first importance to the student.

The lymphatics of *the Rectum* lie in two layers (mucous and muscular), and open into the glands of the mesorectum or into the sacral glands.

The stomata of the peritoneum of the pelvis communicate with lymph capillaries lying in the subendothelial tissue.

Relation between Glands and Lymphatics.

The *Inguinal Glands* (parallel to Poupart's ligament) receive the lymphatics of the vulva, lower $\frac{1}{4}$th of vagina, and urethra.

The *Hypogastric or Internal Iliac* receive those of the bladder, upper $\frac{3}{4}$ths of vagina, and neck of uterus.

The *Sacral Glands* receive those from the rectum.

The *Lumbar Glands* receive the lymphatics from the pelvic glands, body of the uterus, Fallopian tubes, and ovaries.

NERVES.

These are (*a*) Spinal; (*b*) Sympathetic.

Pelvic Nerves.

(*a*) *Spinal.* The pelvic muscles are supplied as follows :—*Levator and Sphincter ani* by inferior hæmorrhoidal branch of pudic, 4th and 5th sacral, and coccygeal nerves; *Coccygeus*, by 4th and 5th sacral and coccygeal nerves; *Muscles of Perineum and Clitoris*, by the branches of pudic nerve.

(*b*) *Sympathetic.* The hypogastric plexus lies between the common iliac arteries; it gives off branches which, reinforced by branches from the lumbar and sacral ganglia and sacral nerves, form the *inferior hypogastric plexuses*—one on each side of the vagina. From these, filaments proceed to the vagina, uterus, Fallopian tube, and ovary.

Frankenhäuser describes a ganglion at the cervix uteri and also a vesical one. Jastrebow found the cervical ganglion to be a plexus with a ganglion enclosed in it.

The terminations of the nerves in the muscular layers of the uterus have been studied by Frankenhäuser, who figures them passing to the nuclei of the unstriped muscle. Those entering the mucous membrane are said to end in ganglia. Numerous end bulbs have been found in the clitoris and vagina.

DEVELOPMENT OF PELVIC ORGANS.

The following is a very brief summary :—

Development.

The *Wolffian bodies* appear in the fœtus about the third and fourth week. They fulfil the function of kidneys until the second month, and then wither, leaving traces in the presence of parovarium and Gartner's canal.

The *Fallopian tubes*, *uterus*, and *vagina* arise from the ducts of Müller. These appear on the anterior aspect of the Wolffian bodies; coalesce below to form the uterus and vagina; while, above, they remain separate, as the Fallopian tubes, and leave traces in the hydatid of Morgagni.

The *ovary* first appears as a thickening on the Wolffian bodies. It is made up of interstitial tissue projecting from them and covered by epithelium—the germ epithelium. According to Foulis, the ova are developed from the latter; the cells of the membrana granulosa are formed from the connective-tissue corpuscles of the interstitial tissue. Waldeyer believes that the ova and the cells of the membrana granulosa both originate from the germ epithelium; and in this Balfour agrees with him (*vide* Pl. X., fig. F).

The *parovarium* arises as a small distinct structure at the summit of each Wolffian body. It persists in the female (fig. 20). In the male it forms the epididymis.

The *clitoris* is developed from a small eminence at the foot of the urogenital sinus.

Up to the second month of fœtal life the genital, urinary, and intestinal ducts open into the cloaca; this then becomes divided by a transverse partition into a posterior anal, and anterior urogenital sinus. The *vestibule* in the adult female is simply the lower part of the latter sinus.

The *labia minora* result from the non-coalescence of folds analogous to those which, by their coalescence, form in the male the corpus spongiosum urethræ.

The *labia majora* are two folds which remain separate in the female but coalesce in the male to form the scrotum.

The *two bulbi vaginæ* are homologous to the corpus spongiosum urethræ.

For fuller details, see *Turner* and *Quain*.

CHAPTER VI.

PHYSICS OF THE ABDOMEN AND PELVIS, WITH SPECIAL REFERENCE TO THE SEMIPRONE AND GENUPECTORAL POSTURES.

LITERATURE.

W. Braune—Die Oberschenkelvene des Menschen in anatomischer und klinischer Beziehung : Leipzig, Veit and Co., 1871. *J. M. Duncan*—On the Retentive Power of the Abdomen : Researches in Obstetrics, p. 409. *Hart*—The Structural Anatomy of the Female Pelvic Floor. *Schatz*—Beiträge zur physiologischen Geburtskunde : Archiv für Gynäk., Bd. IV., S. 191. Einfluss der Lehre vom intraabdominalen Drucke auf die Gynäkologie : Archiv für Gynäk., Bd. V., S. 227. *Simpson and Hart*—The Relations of the Abdominal and Pelvic Organs in the Female. *Van de Warker*—A Study of the Normal Movements of the Unimpregnated Uterus : N. Y. Med. Jour., Vol. XXI., p. 337.

In this chapter it is proposed to give a brief sketch of a subject of the highest importance but still in its infancy. The *resumé* must be restricted, from want of space, to certain practical points of which we consider here the following :—

1. *The effect of intra-abdominal pressure on the female pelvic floor ;*
2. *The results brought about by change of posture, especially by the genupectoral posture ;*
3. *The effect on uterine position of digital pressure in the vaginal fornices.*

THE EFFECT OF INTRA-ABDOMINAL PRESSURE ON THE FEMALE PELVIC FLOOR.

Effect of intra-abdominal pressure.

We suppose the body to be in the upright posture. For simplicity, the pelvic floor is considered as being under fluid pressure. Fig. 58 shows the effect of this on the pelvic-floor segments. Fluid pressure acts at right angles to the limiting surface, which in this case is the pelvic peritoneum. Thus, if the perpendiculars be counted, starting from the symphysis, it can readily be seen that the first three will press the pubic segment against the symphysis ; that the fourth and fifth will do this also, but will further have a resultant tending to drive the pubic past the sacral segment ; that the sixth and seventh will, directly, tend to do this last ; and that the others will drive it partly past the sacral segment, and partly against it. From want of rigidity in the pubic segment, this driving-down tendency is partly lost. Thus the effect of ordinary intra-abdominal pressure is to press the pubic against the sacral segment.

Increased intra-abdominal pressure displaces downwards a definite portion of the pelvic floor, viz., all lying in front of the anterior rectal wall.

There is in the pelvic floor a definite line of cleavage at which it yields, which line runs between the anterior rectal and posterior vaginal walls (see p. 63). This definite downward displacement causes the lesion known as prolapsus uteri.

From this we see that the female pelvic floor is not equally strong throughout. It would be, were the sacral segment prolonged and attached to the symphysis pubis. But then parturition would be an impossibility. It has been constructed not only *quâ* intra-abdominal pressure, but also *quâ* parturition and the vesical and rectal functions.

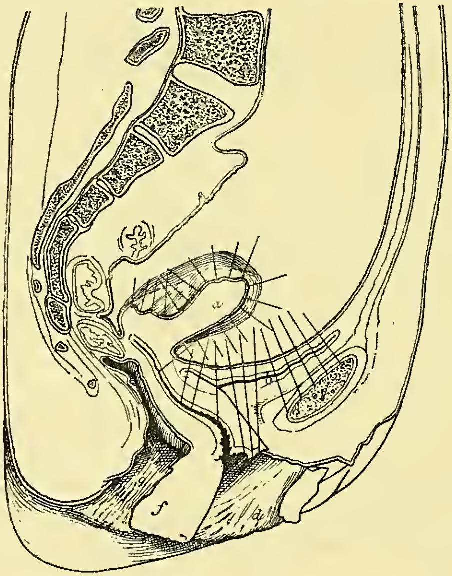


FIG. 58.

DIAGRAM to illustrate effect of intra-abdominal pressure on the segments of the pelvic floor (*Hart*). *a* Uterus pathologically anteflexed ; *b* Bladder ; *c* Retropubic fat ; *d* Labium majus ; *e* Symphysis ; *f* Perineal body ; *g* Rectum.

THE RESULTS BROUGHT ABOUT BY CHANGE OF POSTURE, ESPECIALLY BY THE GENUPECTORAL POSTURE.

Effect of change of Posture.

The abdominal walls, along with the viscera bounded by them, are often spoken of as the abdominal cavity with its contained viscera. We must, however, keep in mind that this cavity is always perfectly full. There is never any vacuum in it. The viscera are always in apposition, with only a little fluid as a film separating them. The abdominal walls are yielding, and any tendency to a vacuum is counteracted by atmospheric pressure on the walls. In no posture, is there ever a vacuum in the abdominal cavity. Even if the trunk were inverted, the small intestines would still touch the uterus as they do in fig. 45 and Plate V. The abdominal walls and viscera enclosed by them behave, therefore, like a plastic viscous fluid—like so much thick gum or treacle.

In the *upright posture*, the viscera bulge above the symphysis pubis, more or less, according to the development of the subject. Plate IV. shows this bulging in a well-formed female; the bulging is excessive if the woman is fat. Just below the sternum, the antero-posterior diameter of the abdomen is lessened. The pelvic floor is convex as seen from without, *i.e.*, the pelvic-floor projection is well marked. Atmospheric pressure is acting equally all over the abdominal and pelvic surfaces; but the pelvic-floor, bearing the weight of the viscera probably bulges more than the other boundaries of the abdomen. A fluid contained in a bag suspended from a fixed point is pyriform, with the bulb nearer the earth. This shape is due to the weight of the fluid.

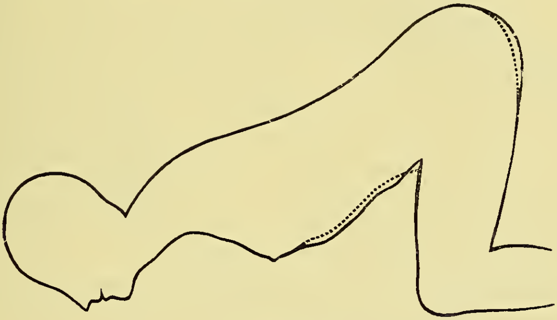


FIG. 59.

OUTLINE OF FEMALE FIGURE IN GENUPECTORAL POSTURE. The dotted line indicates the contour when the vaginal orifice is unopened; the continuous line, the change in contour after air is admitted into the vagina (*Simpson and Hart*).

If a man be made to assume the *posture* known as the *genupectoral* (better *genufacial*), the bulge is at the sternum. The following points should be noted in regard to this posture (fig. 59):—

1. The antero-posterior diameter of the abdominal cavity is increased at the sternum;
2. It is diminished above the pubes and in the iliac fossæ;
3. The pelvic-floor projection is diminished;
4. The pubic and sacral segments are still in contact, and the abdominal viscera always in contact with the uterus and one another.

Let us now contrast these postures.

Upright and Genupectoral Postures contrasted.

Upright posture (Plate IV.).	*Genupectoral posture* (fig. 59).
1. Greatest antero-posterior (*a-p*) diameter of abdomen in hypogastrium.	1. Greatest antero-posterior diameter at sternum.
2. Least *a-p* diameter at sternum.	2. Least *a-p* diameter in hypogastrium.
3. Pelvic-floor projection at its maximum.	3. Pelvic-floor projection diminished.
4. Pelvic-floor segments in contact.	4. Pelvic-floor segments in contact.

In the latter posture, on inspection of the genitals, the labia can be seen to be furrowed and the skin over the ischiorectal fossa slightly hollowed. If now the labia majora and minora be separated and the fourchette lifted up, no further change as yet takes place : but when the hymen is opened up, air passes into the vagina (often with a distinct hiss), and the vaginal walls become separated, enclosing a somewhat large cavity. The bulge at the sternum is now slightly increased, while the diameter in the hypogastrium is diminished (see fig. 59). *It is only when the anatomical entrance of the vagina (the hymeneal orifice) is opened up, that the vagina distends with air.*

It has been shown by A. R. Simpson and D. Berry Hart, that the segments of the pelvic floor separate from each other when a woman assumes the genupectoral posture and the hymeneal orifice is opened. The pubic segment passes down with the viscera ; the sacral segment remains behind, recoiling slightly upwards. *Thus, functionally, the pubic segment is visceral, the sacral one is vertebral.*

They have shown further that there is a definite displacement of the pubic segment constituents, viz. :—

a. The empty bladder is partly above the pubes ;

b. The peritoneum passes from abdominal wall to bladder, at a point 1½ inches above the symphysis ;

c. The retropubic fat is partly above and partly below the top of the symphysis. We may now once more contrast these postures.

Result of distention of Vagina with Air.

Upright posture (Plate IV.).	*Genupectoral posture* (vagina distended with air) (fig. 60).
1. Pubic and sacral segments in apposition and vagina a slit.	1. Pubic and sacral segments separated and vaginal walls bounding a cavity.
2. Retropubic fat behind pubes.	2. Retropubic fat partly above pubes.
3. Empty bladder behind pubes.	3. Empty bladder partly above pubes.

4. Peritoneum passes from anterior abdominal wall to fundus of empty bladder, immediately above symphysis.	4. Peritoneum passes from anterior abdominal wall to fundus of empty bladder, $1\frac{1}{2}$ inches above symphysis.
5. Urethra and bladder meet at a right angle.	5. Urethra and bladder almost in same line.

The reason why the pubic segment passes downwards when the vaginal orifice is opened is, that atmospheric pressure now acts on the vaginal aspect of the pubic segment (with its movable attachment to the pubes) and drives it further down. As the result of this posture, changes take place in the length and direction of the vaginal walls and in the position of the uterus.

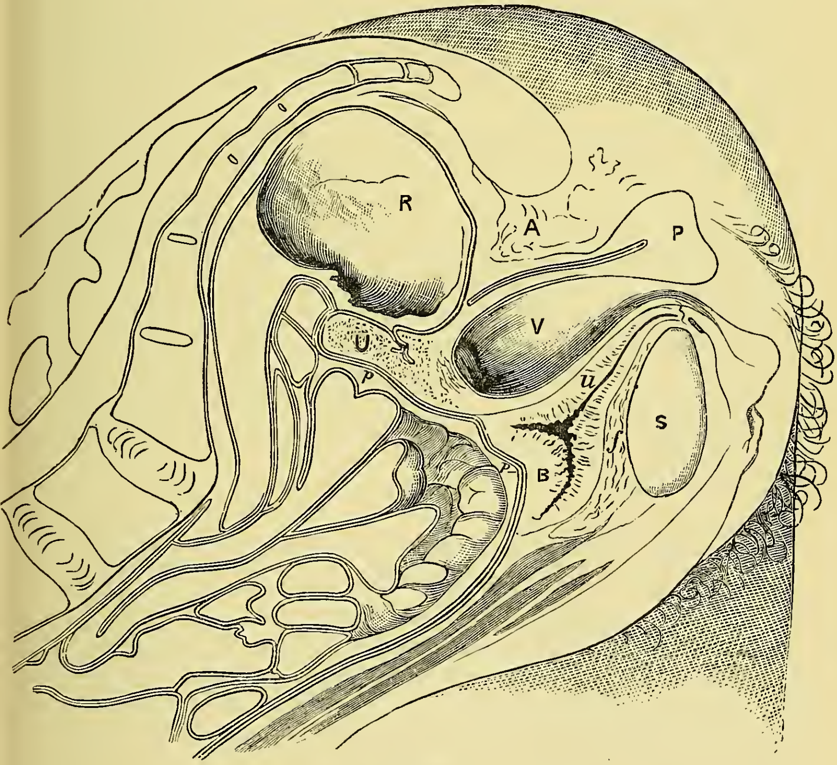


Fig. 60.

Pelvis from Frozen Section of Cadaver in Genupectoral Posture. *A* anus; *P* perineum; *R* rectum; *V* vagina; *u* urethra; *B* bladder; *f* retropubic fat; *U* retroverted uterus; *pp* peritoneum. Between the small intestine and peritoneum is fatty omentum. (*Simpson and Hart.*)

1. *Vagina.*—(*a.*) Both walls elongate.

(*b.*) The anterior follows the direction of the posterior aspect of the symphysis; the posterior, the curve of the sacrum.

2. *Uterus.*—(*a.*) The normally placed uterus passes nearer the sacrum and nearer the thoracic diaphragm.
   (*b.*) The retroverted uterus, fixed or unfixed, becomes more retroverted.
   (*c.*) The retroverted unfixed uterus does not become replaced so as to lie anteverted.

The results given have been obtained as follows:—

a. By observation on living patients, aided by silhouettes of the outlines of the nude body in the upright and genupectoral postures;

b. By study of frozen sections of the female pelvis, and especially by study of a frozen section of a cadaver placed in the genupectoral posture.

For further details on this subject Simpson and Hart's atlas may be consulted.

An important practical result follows from these observations. *The vagina dilates, or, more properly, the segments of the pelvic floor separate exposing their free margins—the vaginal walls—when a patient assumes the genupectoral posture and the hymeneal orifice is opened so as to admit air.* If a patient be so placed opposite a good light, and the sacral segment be drawn up, a complete view of the vaginal walls and cervix is obtained. The same results can be got by placing the patient in the posture known as the *semiprone.* On this last fact is based the use of the vaginal speculum known as Sims' or duckbill speculum (*v.* Chap. XI.).

THE EFFECT ON UTERINE POSITION OF DIGITAL PRESSURE IN THE VAGINAL FORNICES.

This is a subject of great practical importance.

Effect of Digital Pressure in the Fornices.

If, when a patient is lying on her left side, the index finger of the examiner's right hand is passed into the vagina as far as the posterior fornix, and pressure made there, the following results may be noted:—

(1.) The posterior vaginal wall is elongated, the cervix drawn back, and the uterus, if anteverted, becomes more so.

(2.) If the uterus is retroflexed, the flexion is not remedied. Should the fundus be fixed, the retroflexed is increased as the cervix is drawn back while the fundus remains.

Similarly, if pressure be made in the anterior fornix:—

(1.) The uterus becomes elevated and slightly rotated backwards, because the cervix is pulled forwards.

(2.) If the uterus is anteflexed, the flexion is not diminished.

By pressure in these fornices, therefore, we only act on the cervix, unless the uterus is very much retroverted or anteverted. The body of the uterus is acted on only indirectly, through its union with the cervix.

Consequently, no vaginal pessary can undo the flexion of a retroflexed or anteflexed uterus.

CHAPTER VII.

MENSTRUATION AND OVULATION.

LITERATURE.

Beigel—Die Krankheiten des weiblichen Geschlechtes: F. Enke, Stuttgart, 1875. *Dalton*—Report on the Corpus Luteum: Am. Gyn. Tr., Vol. II., p. 11. Physiology, 6th edition, J. & A. Churchill, 1876. *Engelmann*—The Mucous Membrane of the Uterus, with especial reference to the Development and Structure of the Decidua: Am. J. of Obst., Vol. VIII., p. 30. *Frey's* Histology—Barker's Tr., 1874. *Goodman*—The Cyclical Theory of Menstruation: Amer. Jour. of Obstet., Oct. 1878. *Jacobi*—The Question of rest for women during Menstruation: Smith, Elder & Co., London, 1878. *Kinkead*—On the passage of the Ovum from the Ovary into the Fallopian Tubes: Med. Press, September 14, 1881. *Kundrat*—Untersuchungen über die Uterusschleimhaut: Stricker's Jahrbuch, 1873. (Kundrat and Engelmann were co-workers.) *Leopold*—Studien über die Uterusschleimhaut während Menstruation, Schwangerschaft und Wochenbett: Archiv für Gynäk., Bd. XI., S. 1091. Untersuchungen über Menstruation und Ovulation: Archiv f. Gyn., Bd. XXI., S. 347. *Loewenhardt*—Die Berechnung und die Dauer der Schwangerschaft: Archiv für Gynäk., Bd. III., S. 456. *Möricke*—Die Uterusschleimhaut in den verschiedenen Altersperioden und zur Zeit der Menstruation: Ztschr. für Geburtshülfe und Gynäk., VII. Band, 1 Heft, 1881. *Reinl*—Die Wellenbewegung der Lebensprocesse des Weibes: Volkmann's Sammlung, etc., No. 243. *Ritchie, C. G.*—Contributions to Ovarian Physiology and Pathology: Churchill, London, 1865. *Simpson, A. Russell*—Emmenologia; Contributions to Obstetrics and Gynecology: Edinburgh, A. and C. Black. *Stephenson*—On the Menstrual Wave: Amer. Jour. of Obstet., April 1882. *Tait, Lawson*—Br. Med. Journ., June 4, 1881. Notes on the Relations of Ovulation and Menstruation: Medical Times, London, 1884. *Underhill*—Note on the Uterine Mucous Membrane of a Woman who died immediately after Menstruation: Ed. Med. J., 1875. *Williams*—On the Structure of the Mucous Membrane of the Uterus, and its periodical changes: London Obst. Jour., Vol. II., p. 681. *Wyder*—Das Verhalten der Mucosa Uteri während der Menstruation: Zeit. f. Geburtshülfe und Gynäk., Bd. IX., Hft. 1. See also Index of Recent Gynecological Literature in Appendix.

The subject of Menstruation is not as yet well known, and on many points eminent and trustworthy observers are at variance. The nature of the process is at present subtile. The old theories of its being due to plethora or its being a disease are now exploded. The modern view, termed the ovulation theory, asserts that the starting point in menstruation is the bursting of a Graafian follicle. But in cases of abdominal section performed between the menstrual periods, as has been specially observed by Tait and Leopold, Graafian follicles have been found on the point of bursting, clearly showing that ovulation may in certain cases occur remote from menstruation. The only objection that may be urged to this is that abdominal-section cases are not normal. Ritchie, however, long ago insisted on the same view.

Jacobi, Stephenson and Reinl (working on Goodman's cyclical theory) have given good proof that a woman in her full sexual vigour seems to pass through a series of cyclical changes, of each of which the menstrual period is the climax. Jacobi found that, during the few days before the flow, the excretion of urea is increased; the temperature is slightly raised; and that, in regard to the pulse, there is a rhythmic wave beginning at a minimum point 1 to 4 days after the cessation of the flow and gradually rising to a maximum 7 or 8 days before menstruation. So far as our present knowledge goes, the following is a brief *resumé.*

PRELIMINARY CONSIDERATIONS.

Preliminaries.

Definition.—A cyclical change with constitutional disturbances whose most marked local phenomena are periodical flow of blood from the uterine cavity, with shedding of the superficial layers of its mucous membrane, accompanying (according to the hitherto accepted theory) the discharge of an ovum from the ovary, occurring in properly developed women between the ages of 14 and 44, and interrupted by uterogestation and lactation.

Period of its Onset.—Menstruation begins, in this country, usually at the age of 13 to 15 (puberty). It may be delayed till 16, 17, or 20; but this is unusual. Its onset is earlier in warm countries, later in cold ones; earlier in delicately nurtured girls.

Period of its Cessation.—With the interruptions of pregnancy and lactation, it continues in healthy women until the age of 44 to 50. The period of its final cessation is known as the menopause. As a general rule the menopause is early when menstruation has begun early, and *vice versa.*

GENERAL PHENOMENA OF MENSTRUATION.

General Phenomena.

Changes at Puberty.—At this period of life, when the girl becomes the woman, we find certain well marked general changes occurring. The bust and mons veneris develop and the whole contour of the body becomes more rounded and attractive; hair appears on the genitals. The romping carriage of the girl becomes subdued, and greater shyness characterises her conduct to the opposite sex.

Phenomena premonitory to each menstrual flow.—There is usually a feeling of weight in the pelvis and increase of sexual inclination. Many women, however, have very little uneasiness during the whole flow; while others are always considerably distressed,—this distress being still outside the boundary of actual disease.

Periodicity and duration of Discharge.—When once established it recurs, in the large majority of cases (about 87 p. c. of the whole), with great regularity: the most common intervals are 28 days (in 71–p. c.)

and 30 days (in 14– p. c.); less frequent are 21 days (in 2– p. c.) and 27 days (in 1 + p. c.). We speak therefore of the 21 day *type* and so on. The discharge lasts for a number of days, varying from 2 to 8: if below 2 or above 8 it is abnormal; but of course other points besides mere duration must be taken into account.

LOCAL PHENOMENA.

Local Phenomena.

Three periods are distinguished: 1. Invasion; 2. Persistence; 3. Decline.

1. *Invasion.*—Discharge pale.

2. *Persistence.*—Discharge bright red, non-coagulable from its admixture with mucus. It consists microscopically of epithelium from vaginal, cervical, and uterine cavities; mucous globules; compound granular corpuscles; and red and white blood-corpuscles.

3. *Decline.*—Discharge lessens in amount and becomes lighter in colour.

The total *quantity* varies from 2 to 8 ounces.

Thus far we have related facts fairly well ascertained and not much disputed. We now enter on more debateable ground, in considering—

I. Ovulation;
II. The Corpus luteum;
III. Source of discharge, and changes in the uterine mucous membrane.

Ovulation.

I. *Ovulation.*—According to the ovulation theory, ovulation forms the starting point of the process of menstruation. We have already considered the structure and development of the ovary, and now describe

The changes in the Ovary at each Menstrual Period.—A Graafian follicle enlarges and moves nearer the surface. Probably this produces, through a nervous mechanism, a hyperæmia of the whole pelvic contents,—peritoneum, connective tissue, uterus, ovaries, Fallopian tubes, and vagina. It is alleged, as yet on insufficient grounds, that the fimbriated end of the Fallopian tube grasps the ovary, and that the ovum from the ruptured Graafian follicle passes into it and along the tube to the uterine cavity. Professor Kinkead of Galway has recently advanced another explanation. He points out that, between the fimbriated end of the Fallopian tube and the ovary, we have the ovarian fimbria (fig. 20) forming a groove which is converted into a tube by the surrounding viscera; and that we have thus capillary action towards the uterus. This would lead the ovum into the Fallopian tube. However it reaches the Fallopian tube and uterus, its further development depends on its fertilization or non-fertilization. In the latter case it passes off unnoticed in the menstrual discharge; in the former it developes into the fœtus.

Corpus luteum.

II. *The Corpus luteum.*—After the rupture of the Graafian follicle, we get its cavity filled up by the structure known as the corpus luteum. This is formed by proliferation of the cells of the membrana granulosa, by the sprouting of new capillaries with migratory cells into the hypertrophied convoluted epithelium. The central portion degenerates into gelatinous tissue, the cortical into fatty tissue (*Klein and Smith*).

The corpus luteum thus consists of a vascular framework, with a yellow pigmentary and cellular substance. It varies according as pregnancy does or does not follow its formation. The difference is well given in Dalton's table, which we subjoin.

	Corpus Luteum of Menstruation.	Corpus Luteum of Pregnancy.
End of 3 weeks.	12 by 13 mm. in diameter; central clot reddish, convoluted wall pale.	
One month.	Smaller; convoluted wall bright yellow; clot still reddish.	Larger; convoluted wall bright yellow; clot still reddish.
Two months.	Insignificant cicatrix.	12 by 22 millimetres in diameter; convoluted wall bright yellow; clot perfectly decolorized.
Four months.	Absent or unnoticeable.	18 by 22 millimetres in diameter; clot pale and fibrinous; convoluted wall dull yellow.
Six months.	Absent.	Still as large as at the end of the second month; clot fibrinous; convoluted wall paler.
Nine months.	Absent.	10 by 13 millimetres in diameter; central clot converted into a radiating cicatrix; external wall tolerably thick and convoluted, but without any bright yellow colour.

Source of Discharge.

III. *Source of Discharge and Changes in the Uterine Mucous Membrane.*—All observers are agreed that the mucous membrane of the uterine cavity is the source of the discharge, *i.e.*, that it comes from the area limited by the uterine ends of the Fallopian tube and the os internum.

Now begins the divergence.

Williams' view.

(1.) Williams holds that "uterine contraction drives the blood from the muscular wall into the mucous membrane; the vessels of this membrane, having undergone fatty degeneration, give way, and extravasation of blood results. This extravasation takes place always near the surface, for in that situation the degenerative change has most advanced. The rush of blood into the vessels of the mucous membrane expels the contents of the glands, together with the greater part of their lining epithelium. . . . . When hæmorrhage has taken place into the membrane, it undergoes rapid disintegration, and becomes entirely removed." The new mucous membrane "is produced by proliferation of the elements of the muscular wall of the organ: the muscular fibres producing the fusiform cells; the connective tissue, the round cells; and the groups of round cells in the meshes formed by the muscular bundles, the glandular epithelium." These "groups of round cells" may be the terminations of the uterine glands.

In a more recent paper,[1] Williams has modified the statement of his view by affirming that the greater portion of the muscular wall of the uterus represents the muscularis mucosæ. According to this, only the glandular portion of the mucous membrane is shed.

Entire removal of the mucous membrane down to the muscular fibre, and its regeneration from groups of round cells in the muscular coat, are the essentials of Williams' view.

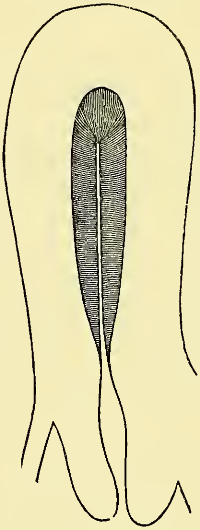


Fig. 61.

Diagram of Uterus just before Menstruation. The shaded portion represents the Mucous Membrane (*J. Williams*).

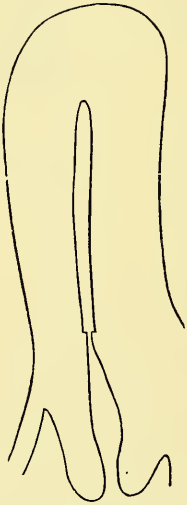


Fig. 62.

Diagram of Uterus when Menstruation has just ceased, showing the cavity of the body deprived of Mucous Membrane (*J. Williams*).

Kundrat and Engelmann's view.

(2.) Kundrat and Engelmann thus describe the changes.

Mucous membrane becomes swollen and pulpy, and measures in thickness 3–6 mm. The thickness is most marked at the fundus and central portions of the anterior and posterior surfaces. The surface is puffy and injected; glands are distinctly seen on section as fine spirals.

Microscopically, this increase in thickness is seen to be due to a proliferation of the round cells of the stroma, an enlargement of all the cell elements in the superficial layers, and an increase of the intercellular substance. This superficial layer has grown far above the original gland openings, causing the funnel-shaped depressions or small pits seen on surface view. The glands are increased in thickness and length. The vessels are enlarged and gorged with blood. Fig. 63 shows the mucous membrane of the menstruating uterus magnified 40 times; it should be compared with the mucous membrane of the non-menstruating uterus at fig. 17, also magnified 40 times.

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[1] On the Circulation of the Uterus, etc.: Lond. Obs. Trans., 1885.

The increase of the thickness of the mucous membrane begins as the time of menstruation approaches, is most marked during the period itself, and gradually decreases after the cessation of the catamenial flow.

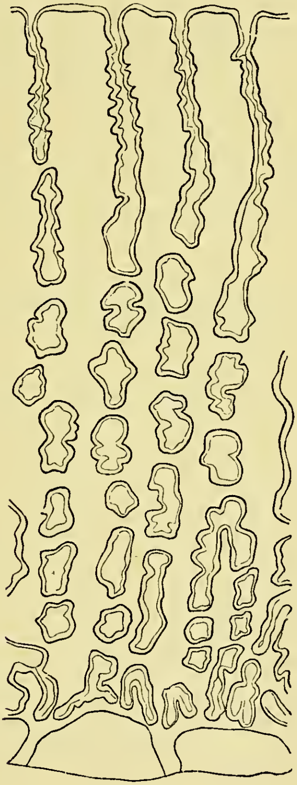

Fig. 63.
Mucous Membrane of Menstruating Uterus (*Kundrat and Engelmann*). ($\frac{40}{1}$)

Fatty degeneration takes place in the cells of the interglandular tissue, blood-vessels, and glandular and surface epithelium.

They hold that "the hæmorrhage is always confined to the surface of the lining membrane, and is due to the fattily degenerated tissue being unable to resist the blood pressure;" and *they therefore maintain, what is most probably the case, that only the superficial layer of the mucous membrane is shed at a menstrual period.*

Leopold's View.

(3.) Leopold denies the existence of any fatty degeneration of the superficial layers of the mucous membrane. He believes that an extravasation of red and white blood corpuscles from the superficial capillaries takes place especially towards the superficial layer, undermining the uppermost layer of cells; and that, finally, the copious supply of blood reaching these capillaries from the numerous arteries causes rupture and bleeding. The mucous membrane is regenerated by an upward growth of the glandular epithelium.

Möricke's View.

Williams, Kundrat, Engelmann, and Leopold examined uteri from *post-mortem* cases. Recently Möricke has curetted the uteri of living women at various stages of menstruation, and microscopically examined what he removed. He asserts "that during menstruation the mucous membrane disappears neither partially nor fully." This shows how widely microscopists vary. Williams says all the mucous membrane down to the uterine muscle is removed; Kundrat, Engelmann, and Leopold say only the superficial layers are removed; and Möricke says none is removed.

We have deemed it best to lay these views before the student. The subject is difficult to investigate, and one on which the authors are not qualified to give an opinion. They incline, however, to the views of Kundrat, Engelmann, and Leopold.

A dispute still exists as to which ovum is fertilised when pregnancy occurs—the ovum of the last menstruation, or that of the first period missed. Many observers believe in Loewenhardt's theory, viz., that the ovum fertilized is that of the first period missed.

Lately the dominant influence of the ovary in menstruation has been questioned by some, notably by Lawson Tait. The operation known as Battey's operation, where both ovaries are removed, does not always cause a cessation of menstruation. Tait asserts that menstruation will always cease if the Fallopian tubes also are excised; and therefore believes that they play an important part in menstruation, hitherto unsuspected.

Leopold's monograph is illustrated by many valuable lithographs, and the same may be said in regard to Dalton's work on the Corpus Luteum.

SECTION II.

PHYSICAL EXAMINATION OF THE FEMALE PELVIC ORGANS.

IN this section we have to take up the physical examination of the female pelvic organs—that is, exploration by the hands and instruments of the gynecologist. This will be considered in the following manner.—

Chapter VIII. Abdominal Examination; Vaginal Examination; the Bimanual Examination, with its various modifications.

Chapter IX. Examination per Rectum.

Chapter X. The Volsella.

Chapter XI. Vaginal Specula.

Chapter XII. The Uterine Sound.

Chapter XIII. Tents and other Uterine Dilators.

Chapter XIV. The Curette.

Chapter XV. Knives; Scissors; Needles; Sutures; Douches and Syringes; Anæsthetics.

Chapter XVI. Relation of Micro-organisms to Gynecology; Antiseptics.

CHAPTER VIII.

ABDOMINAL EXAMINATION; VAGINAL EXAMINATION; THE BIMANUAL EXAMINATION, WITH ITS VARIOUS MODIFICATIONS.

In a female patient whose symptoms point to a pelvic cause, it is necessary to investigate the case by what is commonly known as a vaginal examination. A mere vaginal examination, however, gives very little information. The proper method is first to make an external abdominal examination and then the vaginal examination, the latter being only a stage of the more complete method of investigation known as the bimanual. Special cautions as to cases unsuitable for pelvic exploration are given under the head of vaginal examination. We consider the examination in the following order:—

I. External abdominal examination;
II. Inspection of external genitals (only when necessary);
III. Vaginal examination;
IV. The bimanual (abdomino-vaginal) examination.

EXTERNAL ABDOMINAL EXAMINATION.

External Abdominal Examination.

The patient should lie on the back, with knees drawn up, and head supported on a pillow. The bowels and bladder should be empty. The abdominal surface should be exposed from the epigastrium downwards; no part of the mons veneris should be uncovered. The most delicate method of accomplishing this is as follows. A sheet or blanket is thrown over the recumbent patient; beneath this she raises up her dress as far as the pit of the stomach; the examiner then places his one hand on the sheet, a little above the mons veneris, and turns it down over it with his other hand. The abdominal surface is examined in four ways, viz., inspection, palpation, percussion, auscultation.

Inspection.

A. *Inspection.*—The form, colour, equality or inequality of bulge of the abdominal surface should be noted; the presence or absence of the linea nigra, lineæ albicantes (fresh and old), pigmentary deposits, fat streaks, and skin eruptions. The linea nigra has little significance. The lineæ albicantes indicate that the patient's abdominal cavity is or has been distended beyond the normal. They are not specially characteristic of pregnancy. Fresh lineæ albicantes are glistening and pearly; old ones have a dull-white or scarred appearance.

Palpation.

B. *Palpation* should be performed with both hands. For this purpose the hands, well warmed, are laid flat on the abdominal surface; and the whole area is manipulated between them. One hand alone is of no use. By this method the abdominal contents may be compressed and moved between the hands. The feeling given normally is that of manipulating a plastic fluid. Tapping with one index finger so as to give a fluctuating impulse to the other hand is of great value. Circumscribed nodules or tumours, fluid collections, thickening of the skin, should be noted and mapped out on the scheme given in the chapter on case-taking.

Abdominal regions.

For the more exact localisation of the normal and abnormal abdominal contents, anatomists divide the anterior abdominal surface into definite regions by vertical and transverse lines. The lower transverse line is drawn at the level of the anterior superior iliac spines; the upper one, between the most prominent parts of the ninth costal cartilages. A vertical line joining the cartilage of the eighth rib with the middle of Poupart's ligament on each side, completes the division into nine areas, which are named in order as follows (*vide* Plate IV.).

1. Right Hypochondriac. 2. Epigastric. 3. Left Hypochondriac.
4. ,, Lumbar. 5. Umbilical. 6. ,, Lumbar.
7. ,, Iliac. 8. Hypogastric. 9. ,, Iliac.

In these regions the following structures are found.—

Epigastric Region.—Right part of stomach; pancreas; liver.

Right Hypochondriac.—Right lobe of liver; gall bladder; part of duodenum; hepatic flexure of colon; part of right kidney, and its suprarenal capsule.

Left Hypochondriac.—Cardiac end of stomach; spleen and narrow extremity of the pancreas; the splenic flexure of the colon; the upper part of the left kidney, with the left suprarenal capsule; sometimes also a part of the left lobe of the liver.

Umbilical.—Part of the omentum and mesentery; the transverse part of the colon; lower part of the duodenum, with some convolutions of the jejunum and ileum.

Right Lumbar.—The ascending colon; lower half of the kidney; and part of the duodenum and jejunum.

Left Lumbar.—The descending colon; lower part of the left kidney, with part of the jejunum.

Hypogastric.—The convolutions of the ileum; the bladder in children, and, if distended, in adults also; the fundus uteri when the bladder is distended.

Right Iliac.—The cæcum with the appendix vermiformis, and the termination of the ileum; right broad ligament, with its ovary, parovarium, and Fallopian tube.

Left Iliac.—The sigmoid flexure of the colon; left broad ligament, with its ovary and Fallopian tube.

The student will observe that the above table mentions several of the pelvic organs (uterus and its appendages) as lying in the lower regions of the abdomen; this is done because the obliquity of the brim of the pelvis brings these organs to lie underneath the regions, in which consequently any marked change in them will be recognised.

Ruedinger's Section.

Plate V. shows a valuable coronal section, published by Ruedinger; it should be carefully studied. The numbers refer to the following structures.

1. Right lung. 2. Right auricle; to its left is the larger coronary vein. 4. Right branch of pulmonary artery. The shorter left branch is seen at the left. 7. Liver. Note the impression on its under and right side from the right flexure of the colon. 8. Stomach. Note how its long axis is vertical, and that the main bulk of the stomach is to the left of the middle line. 9. Ascending colon. 9*. Opening of small intestine. 10. Small piece of junction between stomach and duodenum. 11. Pancreas. 12. Duodenum. 13-13. Small intestine. 14. Fundus uteri. 15. Bladder, with ureteric openings. 16. Connective tissue. 17. Descending colon. 18. Sigmoid flexure. 19. Mesentery.

For the relations of the lower regions of the abdomen to the pelvic contents, the student might consult fig. 50, which shows very well the latter as seen through the brim.

In palpating the normal abdomen, the sensation given is one of impulse communicated generally through a plastic fluid. When free fluid is in the abdominal cavity, the impulse is more distinct. When the fluid is encysted, the impulse and tense feeling are localised.

When any large body is felt in the abdominal cavity, the first point to be determined is whether the body is pelvic or abdominal. This is easily done by attempting to press the hand downwards just above the symphysis pubis. If the tumour is pelvic, and rising up into the abdomen, the hand cannot be so pressed; and conversely.

The next point is to ascertain with which of the organs the tumour is connected; and, for this, perfect familiarity with the topography of the viscera is of the highest importance. The student should ask himself what structures are normally present in the region, and then to which of these the tumour is to be referred; with regard to the iliac regions he should bear in mind the frequency of inflammatory deposits in the peritoneum and cellular tissue,—*e.g.* in the right iliac region, besides large intestine, broad ligament, ovary, parovarium, and Fallopian tube, there are peritoneum and cellular tissue in both of which inflammatory deposits are frequent.

In all tumours, the existence or non-existence of intermittent contractions should be carefully noted. Their presence indicates a uterine tumour—pregnancy or soft fibroid.

The following general points should be kept in mind. The bladder is only in the hypogastric region when distended or displaced upwards; if empty, it is behind the pubes and in the true pelvis; a distended bladder may be as large as a six months' pregnancy. Ovarian tumours are more or less lateral; uterine tumours generally central, although the pregnant uterus has usually a right lateral obliquity. In advanced pregnancy, the parts of the fœtus can be distinctly palpated. Finally, it should be kept in mind that in all cases of cystic tumours the catheter should be passed into the bladder, for an obvious reason.

Case.—Mrs A. was sent for consultation as to removal of internal tumour. On examination, a cystic tumour was felt mesially in the abdomen and reaching up to umbilicus. Vaginal and bimanual examinations were exceedingly painful. A catheter passed into the bladder evacuated a large amount of urine. The uterus was now found to be retroverted and gravid 3½ months, and the cystic tumour had disappeared.

Palpation of Groin.

Palpation of the inguinal region is of great importance and should never be omitted. Glandular and other enlargements in this position may be the following.—

(1.) Glands enlarged from gonorrhœa. There are usually one or two—large, painful, and often suppurating.

(2.) Glands enlarged from syphilis. These are multiple, hard, small, painless, and never suppurate in an uncomplicated case.

(3.) Glands enlarged from vulvar malignant disease, or malignant disease of vagina (lowest ¼) or urethra.

(4.) Femoral or inguinal hernia.

(5.) Thrombosis of femoral vein.

Percussion.

C. *Percussion* is to be made in the usual way. To perform this thoroughly, the patient should be percussed (*a*) when on her back; (*b*) when on the left side; (*c*) when on the right side; (*d*) when sitting up. Changes in the percussion note on the patient changing her posture should be carefully noted, as they are of great value (*vide* under Ovarian Tumours and Ascites).

Auscultation.

D. *Auscultation* is performed with the ordinary stethoscope. The fœtal heart, uterine souffle, and friction may be heard by it. The importance of auscultation is evident. Fœtal heart-sounds indicate pregnancy; the point of greatest intensity of the heart-sounds indicates the lie of the child. Uterine souffle and no heart-sounds (after 4½ months) indicate either pregnancy and child dead, or fibroid tumour. Ovarian cysts have no souffle.

Before finishing abdominal examination, the patient should be made to raise her shoulders by grasping the examiner's hands. When there is no encysted abdominal tumour, the recti can be seen to flatten the abdominal contour; if, however, a solid or cystic tumour be present, the contour is unaltered. An exception should be made in the case of thin-walled cysts not tensely filled, where the recti do flatten the contour.

INSPECTION OF EXTERNAL GENITALS.

Inspection of External Genitals.

This should not be made a routine practice. As a general rule, inspection of the genitals should only be made when there is local tenderness, where syphilis or gonorrhœa is suspected, or where it is said by the patient that something comes down at the vaginal orifice. Soft chancres, hard chancres (almost never seen in females), mucous patches, condylomata; urethral caruncles; irritable spots causing vaginismus; labial abscess; parturition tears of perineum and labia; prolapsed pelvic organs; external or internal piles, may be found.

VAGINAL EXAMINATION.

Vaginal Examination.

Preliminaries.—Vaginal examination should not be made on girls below or little beyond the age of puberty, unless the symptoms are urgent, *e.g.* mechanical retention of menstrual fluid from atresia. In the case of unmarried women it should not be performed unless specially necessary. In both classes of patients the value of a rectal examination should be kept in mind. The vaginal examination should be made on married women whose symptoms point to a pelvic cause. Finally, no woman should be examined vaginally when menstruating normally, unless under exceptional circumstances.

Special cases require consideration: viz., that of a mistress who requests a medical man to examine her servant, who is suspected of pregnancy; or of a young woman, who, owing to a malicious report, requests examination as to her condition and a certificate that she is not pregnant.

In the first case, it is better for the medical man not to examine the patient, as he may be liable to an action for assault.

In the second case, the medical man should advise the patient against being examined. This latter case is quite different from that of an unmarried woman who, having run the risk of impregnation, requests examination to settle whether she is pregnant. In this instance the medical man investigates the case in the usual way.

After settling these preliminaries, and having obtained the patient's consent to "examine" (a term which will readily be understood by her as meaning a vaginal examination), the next point is to determine the posture the woman is to occupy while the examination is being made.

Position of Patient.

In this country it is customary to place the patient on her left side for the vaginal examination, and in the dorsal posture for the Bimanual. The patient lies on a convenient couch, with knees well drawn up and clothes loose. The examiner carefully oils or soaps the index and middle finger of his right hand. With his left hand he clears away the clothes from the hips so as to make a passage for the examining fingers, which he passes onwards till he reaches the cleft between the buttocks. He next passes them forwards over the anus, skin over base of perineum and fourchette, until the pulp of the finger rests at the vaginal orifice. In multiparous women, the lax vaginal orifice is easily felt. When in doubt, he passes his fingers cautiously on until he touches the vestibule, which is always smooth. Carrying his fingers back, he will then reach the vaginal orifice at the base of the vestibule.

The tyro must be careful not to pass his finger into the rectum by mistake. He should remember that the vaginal axis passes backwards, the anal axis forwards; that no force is required to pass the finger into the vagina where the hymen has been ruptured, whereas some force is necessary to overcome the resistance of the sphincter ani. The clitoris, lying at the apex of the vestibule, should never be touched, on vaginal examination.

The two fingers being now at the vaginal orifice, should be carried backwards into the vagina until its upper limits are felt. In doing so, the following points should be noted.

What to note.

1. *State of Vaginal Orifice:* patulous or narrow, presence or absence of painful spots, presence or absence of spasm.

2. *Walls:* shape and length; presence or absence of rugæ; moisture, heat, secretion, tumours attached to them; fistulæ; foreign bodies, such as pessaries, glycerine plug, oakum plug.

3. *Cervix:* direction, size, shape, and consistence. Note whether thickened, expanded, and fixed; drawn to one or other side; mobile and not fixed; or whether split and with cicatrices radiating from it to vaginal roof.

4. *Os:* size, shape, consistence of lips. Thus, it may be a dimple, as in nulliparæ; transverse, as in parous women (figs. 13 and 14); or the cervix may be split on one or both sides, and thus no *os externum* be present but the cervical canal be more or less exposed (Plate XII.). Bodies projecting through it should be noted: these may be polypi, fragments of abortion, cancerous masses, stem pessaries.

5. *Posterior fornix* is concave when felt from below. It has normally a feeling like that of the inside of the angle of the mouth. Note if any lump can be felt through it, projecting downwards in Douglas' pouch, rendering the fornix convex. A body or resistance felt through the posterior fornix may be the following:—

Bodies felt through posterior fornix.

(1.) Fæces or tumours in the rectum;
(2.) Acute or chronic inflammatory deposit in the peritoneum or cellular tissue;
(3.) Retroverted fundus uteri (non-gravid or gravid);
(4.) Blood effusion;
(5.) Fibroid attached to posterior wall of uterus;
(6.) Ovary inflamed or cystic;
(7.) Ascitic fluid;
(8.) Extra-uterine fœtation or hydatid (rare).

Anterior fornix.—Note if there is any body felt through it. If so, it is most probably the fundus uteri, normal or enlarged from pregnancy or fibroid. There may be also inflammatory or blood effusions, or a tender ovary, but these are rare here.

7. *Lateral fornices.*—Note cicatrices, prolapsed or cystic ovary, lateriflexed uterus, inflammatory or blood effusion in broad ligament, dilatation of Fallopian tubes, fibroids placed laterally.

The vaginal examination has now been completed. The student should keep in mind that he really learns very little from a vaginal examination, just as he can learn very little as to the size and relation of any object by touching it with the fingers on a but limited area. Vaginal examination is thus only the preliminary to the bimanual or abdomino-vaginal.

BIMANUAL (ABDOMINO-VAGINAL) EXAMINATION.

Bimanual. This method of examination is the all important one in gynecology, and is the one which the student and practitioner will find most valuable, so that its practice should precede all other methods of internal investigation. As the practitioner's experience increases, he will find that he relies more upon this and becomes less dependent on other means of examination.

Method of performing Bimanual. Posture of Patient. The patient must now be placed in the dorsal posture. The head and shoulders should be supported and the knees drawn up.

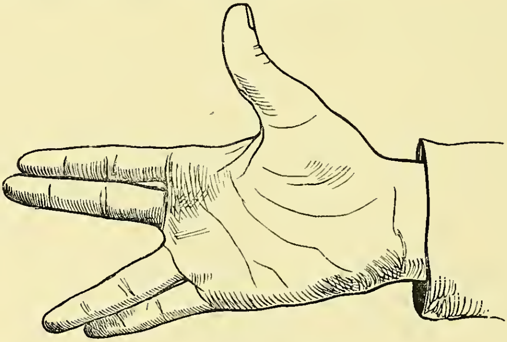

Fig. 64.
Right Hand in Bimanual Examination.

Arrangement of Examiner's hands. The *internal* hand (the right) is placed as follows: The fingers (index and middle) are in the vagina, the thumb rests in the fold between a labium majus and the thigh or upon the symphysis, and the other fingers lie in the cleft of the nates (fig. 68), or flexed on the palm (fig. 65). The whole hand is then rotated backwards so as to bring its long axis as nearly as possible into the axis of the brim, and is then pushed up towards the brim of the pelvis. Thus the pubic segment, uterus with annexa, and posterior vaginal wall are lifted up towards the brim. The middle finger is placed over the os and the index one in the anterior fornix, so that the uterus as it is pushed up becomes more anteverted. The right hand while examining, therefore, has the appearance at fig. 64. The external hand (the left) is placed on the abdominal wall just above the pubes. It is now steadily depressed until the abdominal wall below it is markedly cupped (figs. 65 and 66) and moulded over the uterus and appendages, which have been elevated by the inner hand. In this way the two hands estimate the size and relations of the pelvic contents, just as one would estimate the size of a watch covered with a cloth. The student should note specially that the upper hand should be steadily and not spasmodically depressed; that he should always keep the ulnar edge of the hand (rather than the palm) towards the abdominal surface, so that he may not retrovert the uterus; and that he should palpate all the abdominal areas along the pelvic brim so as not to miss anything. *His first object in the bimanual examination is to determine where the uterus is*, as this greatly simplifies the recognition of abnormal products in the pelvis. He then bimanually explores the fornices, moving the internal fingers appropriately and noting what he feels. At first his diagnosis should be simply physical, *e.g.*, "uterus felt to front and a large firm

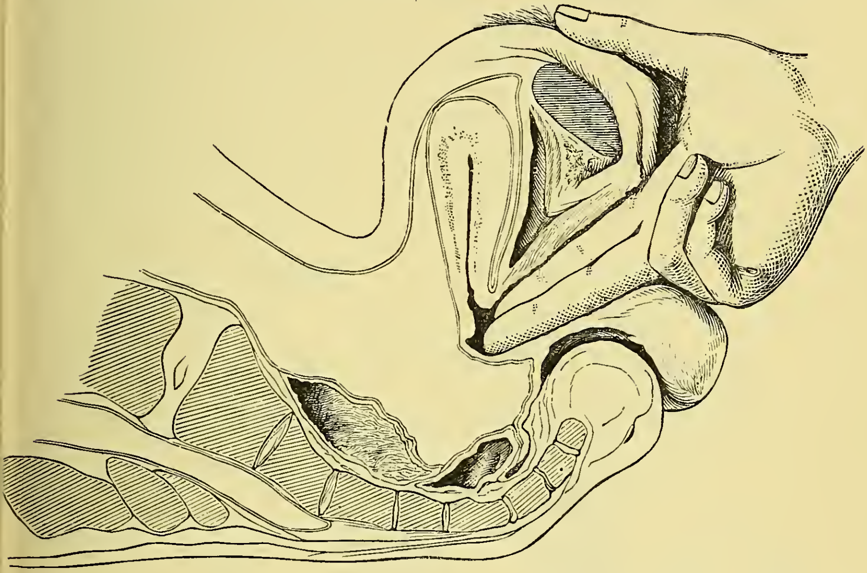

FIG. 65.
BIMANUAL EXAMINATION. The upper hand is not shown. (*Hart*)

Position of Hands in Bimanual.

lump behind it;" or, "uterus felt retroverted and a small moveable tumour on its left side."

Normal condition on Bimanual.

It is of importance that the student should know what a "normal bimanual" is. The following is a description of the condition found in a nulliparous married woman, on vaginal and bimanual examination.

"Ostium vaginæ patulous, and admits two fingers; vaginal walls moist, rugous, with no abnormalities. Vaginal portion of cervix normal in size (fig. 13); os uteri felt like a dimple, looking downwards and backwards. No bodies are felt through the lateral and posterior fornices, which are concave on their vaginal aspects, and have the feeling, on pressure, of the angle of one's mouth. In the anterior fornix a body is felt, which on bimanual examination is discovered to be the uterus lying to the front and not enlarged. The fundus and cervix meet at a very obtuse angle. Bimanual exploration of the fornices reveals nothing distinctly palpable.[1] The patient complains of no pain during the whole examination."

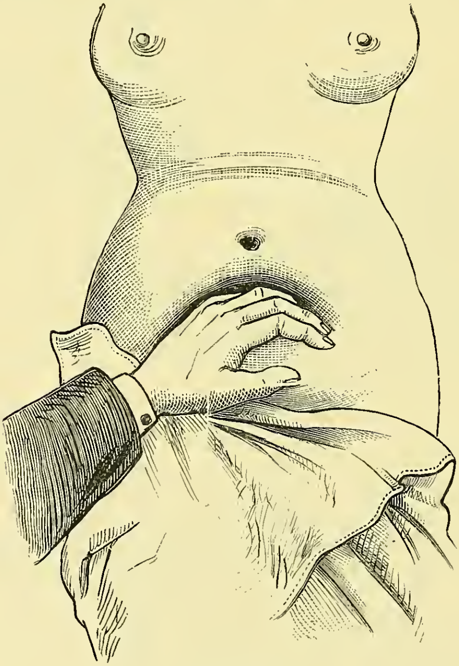

FIG. 66.

ANTERIOR ABDOMINAL SURFACE with upper hand placed for Bimanual (*ad naturam*

The hand is really turned more round towards the middle line than appears in the cut, and pressure is made with the tips of all the fingers so that they are almost perpendicular to the abdominal surface.

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[1] One practised in the Bimanual can feel the normal ovaries.

Cases where the Bimanual is difficult. The student will soon find that the bimanual can be performed in certain cases with great facility and accuracy, while in others it is exceedingly unsatisfactory.

Difficult Bimanual.

The best case for a Bimanual is in a patient a fortnight or three weeks after delivery. The reasons for this are evident: The ostium vaginæ and vaginal walls have been relaxed by the child's head; the pubic segment has been drawn up and its attachments slackened; the abdominal walls have had their elasticity diminished by the full-time uterus, and the uterus itself is not involuted to its normal size. In such a case, there are evidently all the requisites for a good bimanual.

Difficult bimanual cases are found in stout nulliparous women, and in cases of pelvic inflammation. In such, the rectal examination (with or without the use of the volsella) is indicated.

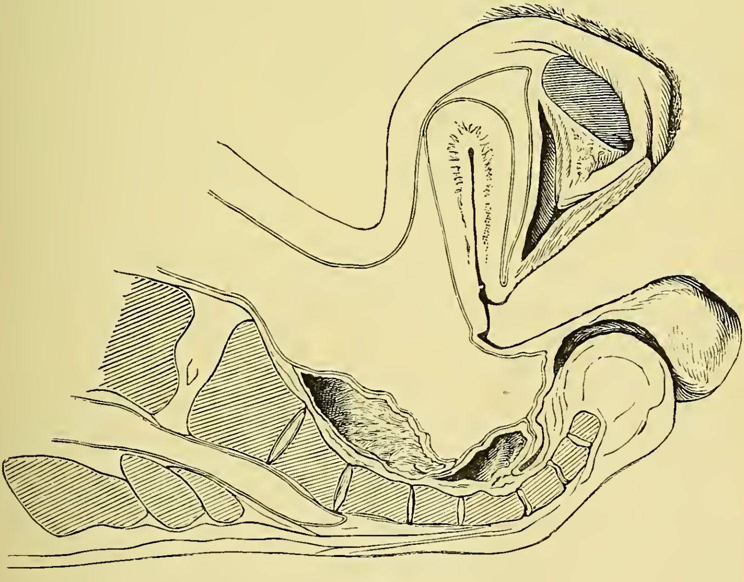

Fig. 67.

Displacement of Pelvic-Floor Segments and abdominal Wall in Bimanual (*Hart*).

Students at first find the Bimanual unsatisfactory. By perseverance, however, they will obtain by means of it an accuracy in diagnosis which is astonishing. It is not only the best means of investigation, but one from which no possible harm can arise. In no cases is it contra-indicated except those of advanced cancer or of acute inflammation.

We have described the simple abdominal-vaginal examination. It will be readily understood that we may have others, as follows:—

Varieties of Bimanual.

(1.) Recto-abdominal (finger in rectum and left hand above);

(2.) Recto-vagino-abdominal (middle finger in rectum, index finger in vagina, and left hand above);

(3.) Vesico-vagino-abdominal (middle finger in vagina, index in bladder, and left hand above);

Of these the third is very rarely practised.

Anatomy of Bimanual.

Note that in the Bimanual the pubic segment with uterus and its annexa are elevated, the sacral segment shortened, and the abdominal wall depressed (fig. 67).

Before and after the Bimanual or other examination, the examiner should scrupulously cleanse his hands. There are no better substances for this than turpentine and ordinary soap. The odour is by no means disagreeable, and if found objectionable can be easily covered by vinegar, which in itself is a good cleanser. The hands should finally be rinsed (without soap) in corrosive sublimate, 1 in 2000 or 3000. In examining cancerous cases, where the odour is exceedingly penetrating and persistent, it is a good plan to dip the fingers in turpentine prior to the examination. (*v.* Chap. XVI. Antiseptics.)

CHAPTER IX.

EXAMINATION PER RECTUM.

LITERATURE.

Hegar—Die operative Gynäkologie, zweite Auflage: Stuttgart, 1881. *Mundé*—Minor Gynecology: Wood & Co., New York, 1881. See also Index of Recent Gynecological Literature in the Appendix.

Rectal Examination.

THE results obtained by a vaginal examination are limited by the fact that the reflection of the vaginal walls to form the fornices, prevents the finger being pushed up to a sufficient distance. This defect is compensated for by the downward pressure of the upper hand in the Bimanual; but in cases where the abdominal walls are unyielding or the pubic segment stiff, due pelvic exploration by an abdomino-vaginal examination alone is impossible. In such cases, rectal exploration and the abdomino-rectal or abdomino-recto-vaginal examination are invaluable; they give better information than the more commonly practised abdomino-vaginal.

Methods.

The usual methods are the following:—

(1.) Simple rectal, abdomino-rectal, abdomino-recto-vaginal;

(2.) Passage of the *whole* hand into the rectum (Simon's method).

SIMPLE RECTAL; ABDOMINO-RECTAL; ABDOMINO-RECTO-VAGINAL.

Preliminaries.

Preliminaries.—The patient should be told that it is necessary to examine the bowel. If the rectum is loaded the examination should be deferred till next day, and the patient instructed to use a purgative at night and an enema in the morning.

Manner of Performance.

The following points should be especially noted. The examiner should thoroughly soap the fingers and nails. A vaginal examination may be made first; and then, the index finger being kept in the vagina, the middle one is passed into the rectum (fig. 68). If the patient is virginal, and it is wished to avoid a vaginal examination, then the index finger alone is passed into the rectum. When the finger or fingers are withdrawn from the rectum the hands should be at once cleansed; there can be nothing more hurtful to a patient's feelings than the passing of the uncleansed fingers from the rectum into the vagina. The patient lies first on the left side and then on the back.

Anatomy of Rectal Examination.

The finger passed into the rectum goes forwards; when passed into the vagina, the direction is backwards. After overcoming the resistance of the strong external sphincter it enters the rectal ampulla (fig. 34), which is often expanded by flatus. Passing the finger onwards and to the left side, a confused mass of tissue is felt in which we may detect the opening betwixt the segments of the sphincter tertius.

What to Note.

As we pass the finger inwards we note piles (internal and external), fissures, polypi, ulcers, stricture (specific and malignant).

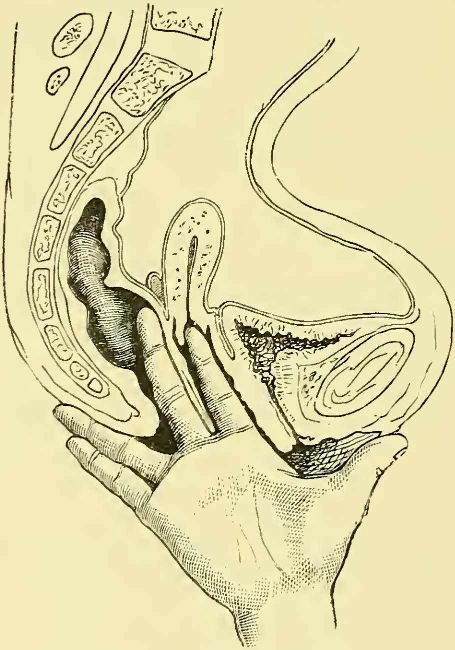

Fig. 68.

Abdomino-recto-vaginal Examination. Upper hand not shown. Note prolapsed ovary.

We next turn the pulp of the examining finger so that it lies on the anterior rectal wall. Through this can be felt the cervix. Note that the whole cervix is felt, which is much larger than the vaginal portion felt on vaginal examination. Be sure not to mistake it for the body of the uterus. If the uterus lies to the front, its forward direction can be noted; if to the back, then the body will be felt on passing the finger further up. Pushing the finger well upwards and passing it first to the right and then to the left, we feel the ovaries (more distinctly when enlarged) as small oval tender bodies (fig. 68).

Diagnosis of Anteflexion.

Fig. 38 shows a common condition of the uterus which is frequently mistaken for and treated as a retroversion. We allude to the uterus anteflexed and drawn back by cellulitis of the utero-sacral ligaments. As such patients are usually nulliparous and have therefore somewhat unyielding abdominal walls which cause a difficult bimanual, and as a lump is felt in the posterior fornix, the diagnosis of retroversion is often made. The rectal examination, however, clears up the case; as the finger feels the knee of the flexion and the fundus going forwards from it.

The *upper hand* is used during the rectal examination just as in the Bimanual, *i.e.*, the examination is abdomino-recto-vaginal or abdomino-rectal. The simple rectal (with the finger in the rectum unaided by the other hand) does not give much information as to the condition of the uterus.

Where, from rigidity of the abdominal walls, it is difficult to press down or fix the uterus with the external hand, this may be done with the volsella in the vagina. The use of the volsella enables us to draw the uterus better within reach of the finger in the rectum. This examination per rectum aided by the volsella will be considered in the next chapter.

Value of Rectal Examination.

Of all manual examinations of the pelvis, the abdomino-rectal or abdomino-vagino-rectal is the most thorough. In retroversions, prolapsed ovaries, and pathological anteflexion, it is of special value. A patient may object to it and refuse to allow it; and, of course, the practitioner must keep this in mind.

SIMON'S METHOD OF PASSING THE HAND INTO THE RECTUM.

Simon's Method.

This consists in passing the whole hand through the sphincter ani into the rectum, and even up to the transverse colon. The patient is deeply narcotised; the hand is passed cautiously through, by inserting first two fingers and the others successively until the entire hand is passed; incision of the sphincter ani may be necessary. Sometimes an incurable incontinence of fæces has resulted.

The unanimous opinion of gynecologists is that this severe method of examination is unnecessary. Careful bimanual examination, aided when necessary by anæsthetics, gives equally good results.

For specialists it is of use to know that valuable results in minute precise rectal examination can be got by first injecting air into the rectum. The whole rectum up to the sigmoid flexure can be dilated, the sphincters made out and the bony pelvic wall carefully explored. It is necessary to add, however, that this is an adjunct to the rectal method of examination of use only in certain very rare instances.

CHAPTER X.

THE VOLSELLA.

LITERATURE.

Goodell—Some Practical Hints for the Treatment and the Prevention of the Diseases of Women : Medical and Surgical Reporter, January, 1874. *Hegar*—Zur gynäkologischen Diagnostik : Die combinirte Untersuchung, Volkmann's Sammlung, No. 105. *Simpson, A. R.*—The Use of the Volsella in Gynecology : Contributions to Obstetrics and Gynecology, p. 183. The literature is fully given in A. R. Simpson's paper.

Volsella.

We have already seen that one of the most striking anatomical features and properties of the uterus is the considerable range of its mobility in almost every direction. It can be pushed upwards from its normal position 1½ or 2 inches, and is displaceable forwards or laterally in a very marked degree. If laid hold of with the instrument known as a volsella, it can be drawn downwards (by a force not exceeding five or six pounds) until the os externum lies close to the vaginal orifice. This procedure facilitates, in suitable cases, diagnosis and treatment of gynecology so much that it is well worthy of the allotment of a special chapter to its discussion. We consider the following points :—

1. Description of instrument ;
2. Method of use ;
3. Mechanism of the displacement it causes ;
4. Uses ;
5. Contra-indications.

Description of Volsella.

1. *Description of Volsella.*—At fig. 69 is seen the useful volsella employed by A. R. Simpson. As it is generally the anterior lip of the cervix that is laid hold of, and the volsella lies along the straight anterior vaginal wall, the slight pelvic curve given to the blades is unnecessary. Fig. 70 shows Hart's volsella, where this straightness of the blades *quâ* the vagina is secured, and the handle and fingers of the gynecologist are kept away from the vaginal orifice by the bend on the handle. Every volsella should have a catch on it. Sometimes it is useful to have an instrument whose blades pass over one another, so as to separate, for instance, the lips of a split cervix : such is Hanks' instrument.

Method of Use.

2. *Method of Use.* (*a*). *Without previous passage of Speculum.*—The patient is placed in the ordinary left lateral posture. Two fingers of the right hand are passed into the vagina, and the anterior lip of the cervix

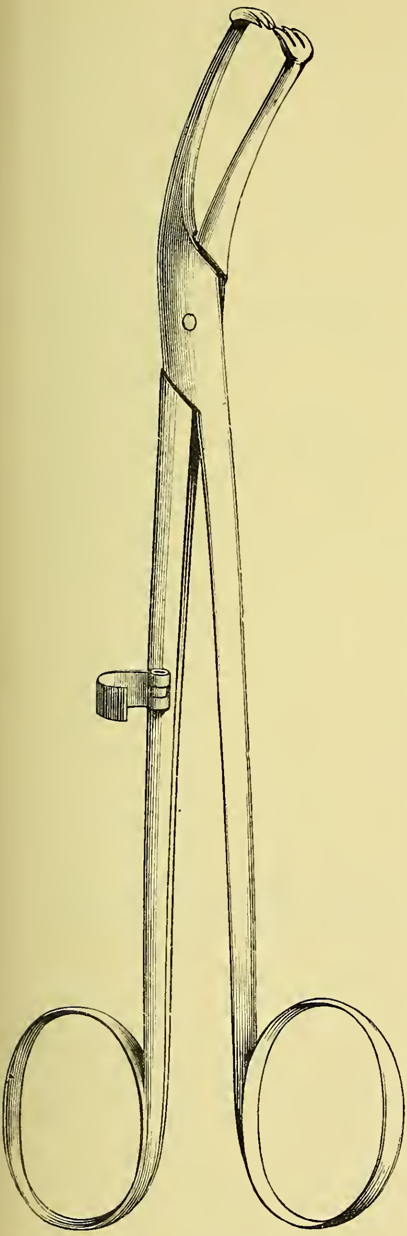

FIG. 69.
A. R. SIMPSON'S VOLSELLA with catch.

touched. The volsella, held in the left hand, is guided along between the index and middle exploring fingers; the anterior lip of the cervix is seized and drawn down. Rectal examination is now made. (*b.*) *With the Speculum.* — For this see Chapter XI.

Mechanism of the Displacement caused.

3. *Mechanism of the displacement it causes.*—The uterus is drawn down so as to lie behind the symphysis pubis. If drawn down fully, as it may be in exceptional cases, it has its long axis in the vagina and the os externum near the vaginal orifice.

The vaginal walls are inverted: *i.e.*, when the os externum is at the vaginal orifice, we have a deep pouch behind and in front of the uterus.

The relations of the bladder and rectum are given in fig. 71.

Use in Diagnosis.

4. *Uses.* (*a*) *In diagnosis.*—(1.) The cervix, which may seem "ulcerated," as it is commonly called, is easily demonstrated by the volsella to be singly or doubly lacerated. For this purpose the anterior and posterior lips are laid hold of, and when brought together the ulceration is seen to be due to laceration with eversion.

(2.) Abdominal tumours can be shown to be connected with the uterus or not as the case may be. If the patient be placed in the dorsal posture and the tumour be laid hold of by an assistant, then when the uterus is drawn down, the tumour can be felt to descend, if fixed to it.

(3.) To the examination *per rectum* the volsella is a valuable addition. If one finger be placed in the rectum and the cervix laid hold of with a volsella and drawn down, the mobility of the uterus can be estimated; the whole posterior uterine surface may be palpated for small fibroids. The ovaries are made more accessible; and the uterus, especially if small, can have its length estimated by the rectal finger.

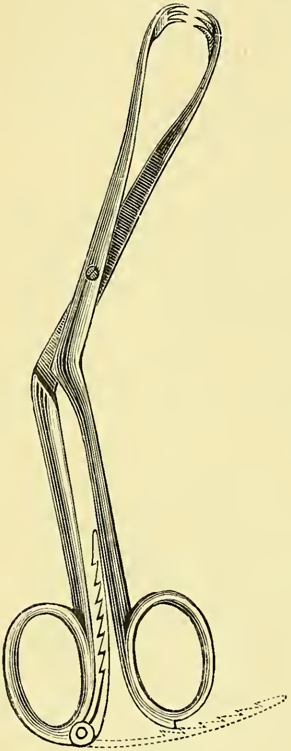

Fig. 70.
Hart's Volsella.

This method of examination of the uterus by rectum and volsella, judiciously conducted, is of the very greatest value.

It is evident that it will also help one as to the diagnosis of displacements of the uterus; but its value in this respect is somewhat lessened by the displacement its use causes. Thus it makes a retroversion less retroverted; an anteflexion less anteflexed; an anteversion less anteverted.

Use in Treatment.

(*b*) *In treatment.*—In this the volsella is one of the most useful instruments the gynecologist possesses. Thus it helps greatly in the examination of the aborting uterus; in replacement of the gravid or non-gravid retroverted uterus; in insertion of sponge or tangle tents, or stem pessaries. In operations such as Emmet's for repair of the cervix, Sims' division of the cervix, amputation of vaginal portion of cervix, excision of the uterus through the vagina for cancer, it is indispensable.

Details of its uses in these cases will be given under the special descriptions of the operations; and it will also be shown in the Chapter on Specula, that by using the volsella the speculum may be dispensed with in certain cases.

Contra-indications.

5. *Contra-indications.*—It should not be used in acute peritonitic or cellulitic attacks, in distended Fallopian tubes, in hæmatocele or in advanced cancerous disease. No pain should be caused by its use provided that only the vaginal aspect of the cervix is laid hold of.

Amount of traction to be used.

The amount of traction to be made will vary with the necessities of the case. In many instances only a mere steadying action is requisite; in others the cervix has to be drawn half-way down the vagina. In special cases the cervix is drawn down to the vaginal orifice or beyond it, as in amputation of the cervix or excision of the uterus.

For simply steadying the cervix, *Sims' tenaculum* is of great service (fig. 72). This is a form of sharp hook with a delicately made stem diminishing to the point which is set on the stem almost at a right angle; the hook should be only very slightly curved in. In operating on carcinoma cervicis uteri, the volsella is occasionally unsuitable as the tissue is too friable. A hook may be passed into the cervical canal in such cases so as to draw down the uterus sufficiently.

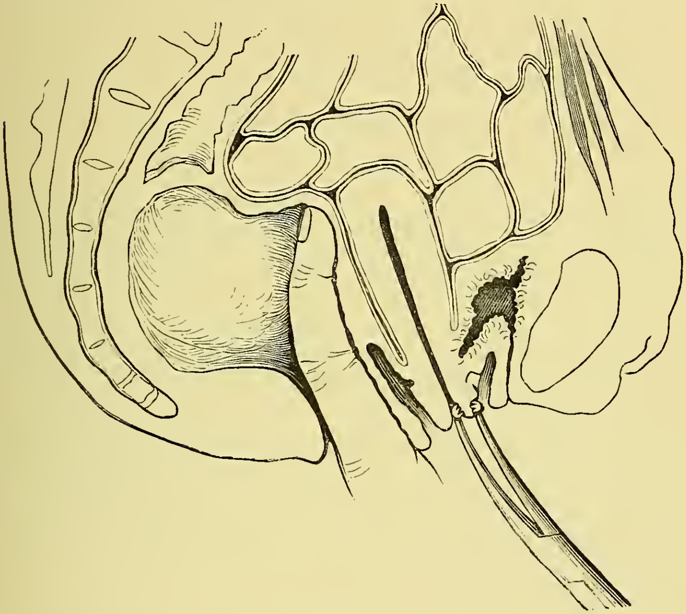

Fig. 71.
Mechanism of Displacement of Pelvic-Floor Segments when Volsella is used.

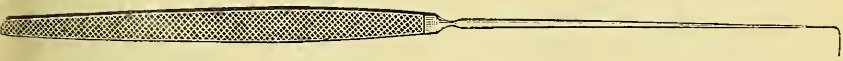

Fig. 72.
Sims' Tenaculum.

CHAPTER XI.

VAGINAL SPECULA.

LITERATURE.

Barnes—Diseases of Women: London, 1878. *Goodell*—Lessons in Gynecology: Philadelphia, 1880. *Hart*—Structural Anatomy: Edin., 1880. *Mundé*—Minor Gynecology: Wood & Co., New York.. *Sims, J. Marion*—Clinical Notes on Uterine Surgery: Hardwicke & Co., London, 1866. *Thomas*—Diseases of Women: Philadelphia, 1881.

Vaginal Specula.

We have already seen that the segments of the pelvic floor are separable when a woman assumes certain postures; that the sacral segment can be hooked up, and that by this means we get a view of the vaginal boundaries of these segments and of the os uteri. This is the natural method of opening up the pelvic floor; or the natural specular method.

Gynecologists had used various instruments for enabling them to look into the vagina: but all of these proved unsatisfactory until Marion Sims, noting the natural postural dilatation of the vagina, introduced his famous duckbill speculum.

Varieties.

We take up the consideration of three types of speculum, viz.:—

1. spatular—the duckbill or Sims speculum;
2. tubular—the Fergusson speculum;
3. bivalve—the Neugebauer, Cusco and other modifications.

We note under each its nature, the method of employing it, and the theory of its action and uses.

Sims' Speculum.

1. The Sims or Duckbill Speculum is shown at figs. 73, 74, and Plate VIII.

Nature.

Its Nature.—Each instrument in reality consists of *two specula*, which are of different size and connected by a handle; usually, however, we speak of these specula as the *blades* of the *speculum.* The real Sims speculum is light, has each blade slightly concave on its anterior aspect, and has the blades at *right* angles to the intermediate handle.

Modifications.

Bozeman's.

Modifications of Sims' speculum are numerous. Indeed, it seems difficult for gynecologists to resist modifying an instrument, and rare to find them improving it. The most widely known modification is Bozeman's; it is heavier than Sims', has the blades meeting the handle at an acute angle, and the blades more concave on the anterior aspect. (Figs. 74 and 75.)

One curious fact about almost all specula is, that they are too long.

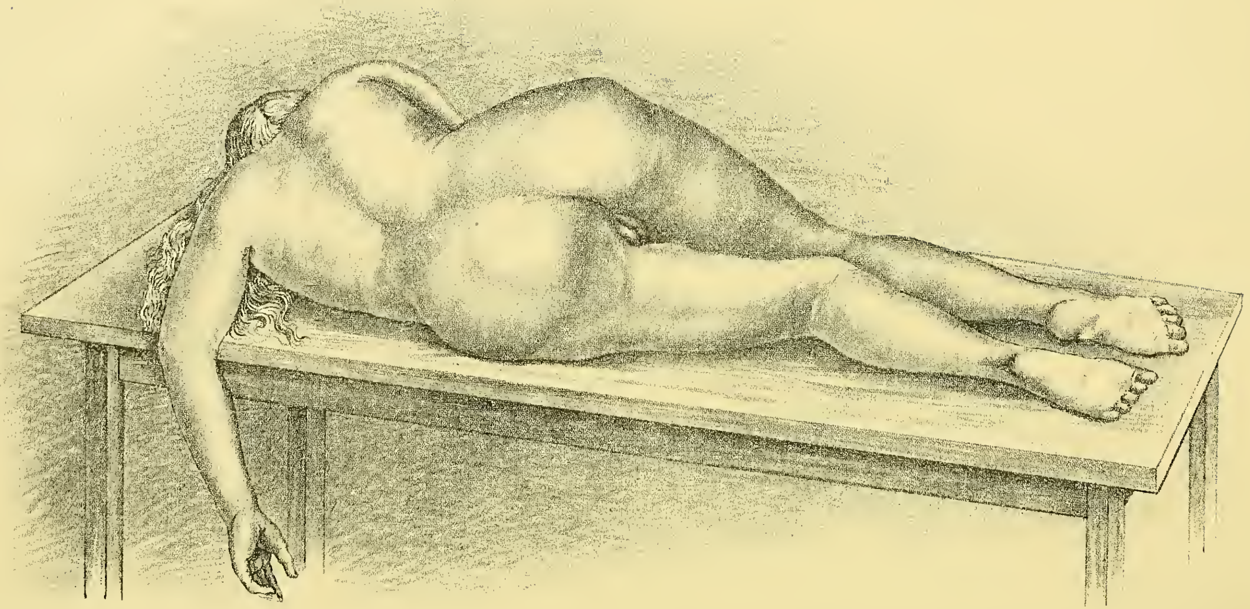

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PLATE VII.—FEMALE CADAVER IN SEMI-PRONE POSTURE (DRAWN FROM NATURE).

Sims' blade is 4 inches long, though the posterior vaginal wall measures only $3\frac{1}{2}$ inches. Thus, as we wish to expose only the anterior vaginal wall and cervix uteri, a 3-inch length of blade is sufficient.

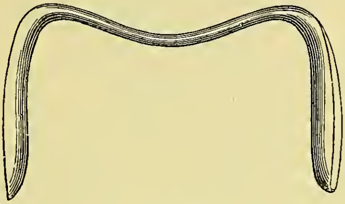

Fig. 73.
Sims' Speculum.

Battey's.

A modification of Sims' speculum, by Battey of Georgia, is worthy of note. It has one short blade which meets the handle at a more acute angle. (Fig. 76.)

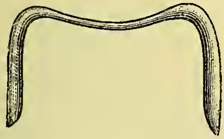

Fig. 74.
Sims' Speculum.

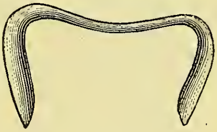

Fig. 75.
Sims' Speculum modified by Bozeman.

Method of Use.

The method of employing Sims' speculum.—Under this it is important to note :—(*a*) How to place the patient, (*b*) How to pass the speculum, and (*c*) How to hold it when passed.

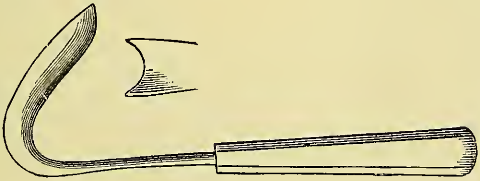

Fig. 76.
Battey's Speculum.

Position of Patient.

(*a*). *How to place the patient.*—The patient must be placed in the Sims or semiprone posture. This is briefly as follows: the patient lies almost on the breast; *the lower left arm is over the edge of the couch* next the gynecologist; the hips are close to the edge; the knees are well drawn up; and the *upper or right knee touches the couch with its inner aspect.* The posterior aspect of the sacrum is therefore oblique to the horizon. (Plate VII.)

As the result of this posture—a modified genupectoral one—the vaginal walls separate when air is admitted; the pubic segment passing down with the viscera, the sacral one remaining behind.

Passage of Speculum.

(*b*). *How to pass the speculum.*—Choose the blade which is of the proper size to pass the vaginal orifice; warm it, and oil it with the fingers on its convex aspect only. The concave surface must be dry to reflect light, and therefore the speculum should never be oiled by dipping it. Hold it by the other blade in the left hand, as shown at fig. 77. Then pass the index and middle fingers of the right hand into the vagina to separate the labia; carry in the speculum between them; push it onwards, following the curve of the posterior vaginal wall, until the beak of the instrument lies in the posterior fornix. Now draw the instrument back as a whole, in a direction at right angles to the posterior vaginal wall; then turn the beak forwards, so as to bring the cervix more into view. Finally, tilt the blade so that the beak lies on a lower level than the proximal end of the blade; this keeps up the upper labium.

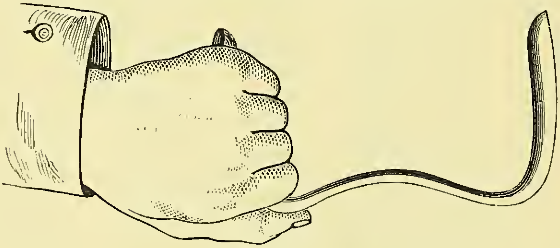

FIG. 77.
One method of holding the SIMS SPECULUM.

How it is held.

(*c*). *How to hold the speculum when passed.*—Plate VIII. shows the speculum passed, and a convenient way of holding it. When passed, the cervix may be drawn down with a volsella (also shown in Plate VIII.). Various attempts have been made to add to the Sims speculum a means of rendering it self-retaining; the majority of these are by no means successful, and therefore we need not describe what is seldom used. The knowledge of a simple method of effecting this in Battey's speculum is of use. This has a piece of indiarubber, with a hook at the end attached to the handle, which can be fastened in the pillow, sheet, or patient's dress; the cervix is drawn down with a volsella held in the one hand, leaving the other free for minor manipulation.

Action and Uses of Sims' Speculum.

Theory of action and uses of the Sims speculum.—The Sims speculum is based on the effects consequent on the genupectoral posture. When the patient is semiprone and the vaginal orifice opened, the segments of the pelvic floor separate; and then the Sims speculum is a simple means of hooking the sacral segment well back.

The Sims speculum is, on the whole, by far the most useful speculum.

PLATE VIII.

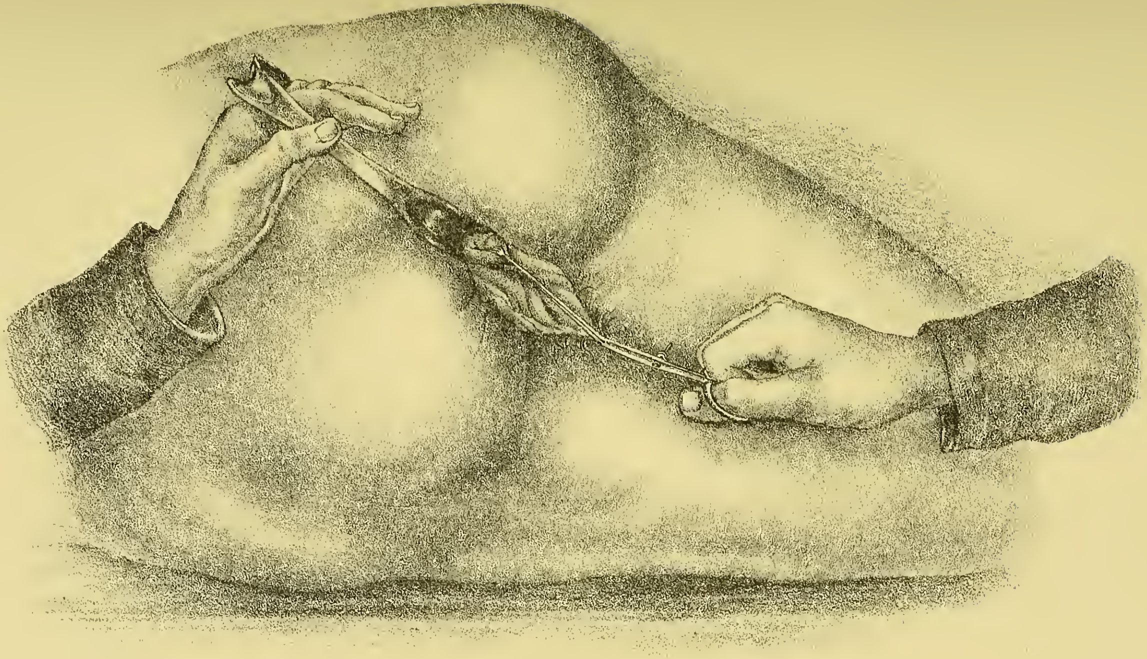

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PLATE VIII.—FEMALE CADAVER IN SEMI-PRONE POSTURE, WITH SIMS' SPECULUM PASSED AND UTERUS DRAWN DOWN WITH A VOLSELLA.

It is difficult to manipulate at first, but amply repays practice. Its invention has been one of the greatest strides in gynecology. In vaginal and cervical operative surgery, it is the only speculum that can be used.

Fergusson Speculum.

2. THE FERGUSSON SPECULUM is seen at fig. 85. It is made in three suitable sizes; and may be described as a glass tube, with a proximal trumpet and a distal bevelled end. It is made of glass, silvered on the outside and coated with caoutchouc. The bevelling of the distal end makes a shorter anterior side and a longer posterior one. The maker's name is usually placed at the trumpet end, at the foot of the anterior side, and serves to indicate that side when the speculum is in the vagina.

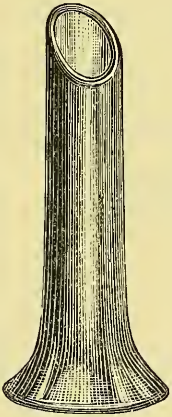

FIG. 78.

FERGUSSON SPECULUM.

How used.

Mode of employment of the Fergusson speculum.—The patient lies in the left lateral position with hips raised. Warm the speculum, and oil it on the outside. Take it by the trumpet end with the right hand and pass it into the vaginal orifice previously opened up by index and middle fingers of the left; now push it in, short side to the front, until arrested. By looking along it, the practitioner can note if the cervix is in view. It is generally not so, but may be snared by the following manœuvres: carry the trumpet end well back towards the perineum, and then depress the distal end first to the left and then to the right, finally turning it round if these fail. In multiparæ with lax vagina it is easy to pass the Fergusson; but it is more difficult in nulliparæ.

Uses.

The Fergusson is a favourite speculum with many. It is useless in vaginal and cervical surgery, but with it applications to the cervix can be made very well and easily. When used for making applications to the endometrium, it is advisable to pull the cervix well down with a volsella after the speculum is passed, and to use a straight sound covered with cotton wool.

3. Of *bivalve specula* there are various forms: the Neugebauer with its modification—the Crescent Speculum of Barnes; the Cusco, which is often called the Bivalve Speculum; and other varieties.

Neugebauer.

The Neugebauer is like a Sims speculum divided transversely at the middle of the handle (fig. 79). It is also made in suitable sizes.

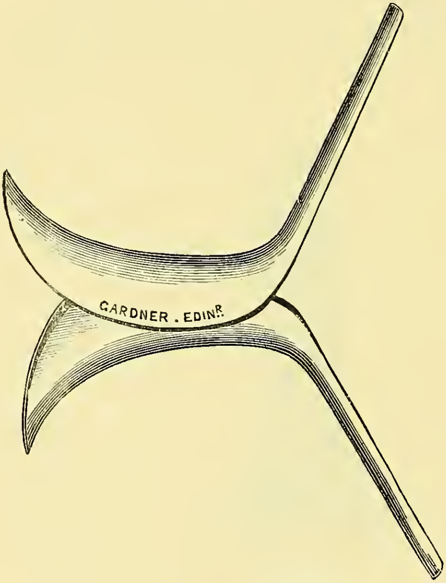

Fig. 79.
Neugebauer's Speculum when passed.

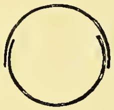

Fig. 80.
Cross section showing relation of blades; the upper is posterior.

How used.

Mode of employment.—Warm and oil *two* blades. Introduce one blade (the broader one) with its convexity touching the posterior vaginal wall. Then introduce the other with its convexity touching the anterior vaginal wall and so that its edges fit within the edges of the posterior vaginal wall blade (fig. 80). The beak of the posterior blade is thus in the posterior fornix; that of the anterior blade in the anterior fornix. From their contact a leverage is obtained on approximating the handles, by which traction is made on the fornices, and the cervical canal more or less everted.

Barnes' Crescent Speculum.

Fig. 81 shows a useful modification of this by Barnes, known as the Crescent speculum.

The Neugebauer and Crescent specula are useful in making cervical and endometric applications, and are better specula than the Fergusson.

Cusco Speculum.

The Cusco or Bivalve Speculum is shown at fig. 82. It is composed of two blades jointed on to one another at their bases. The blades are opened to the desired distance by pressure on the thumb-piece, and kept open by a screw. It is introduced with its blades right and left, and then turned so that they lie anterior and posterior, that with the screw being posterior. It is then pushed onwards, and the blades opened and fixed by the screw. Care should be taken not to catch any of the hair in the screw; and, in withdrawing it, not to pinch up the vaginal walls.

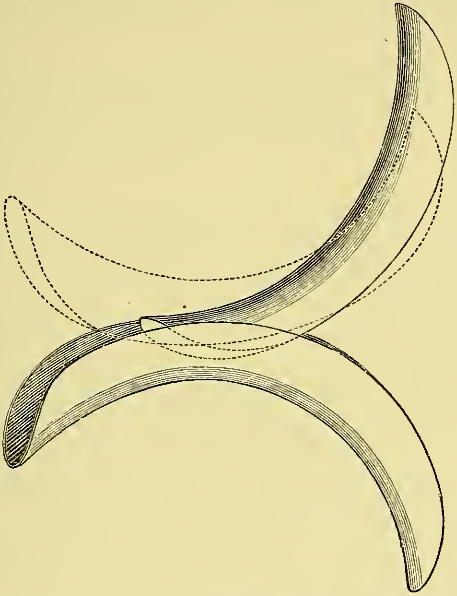

FIG. 81.
BARNES' CRESCENT SPECULUM.

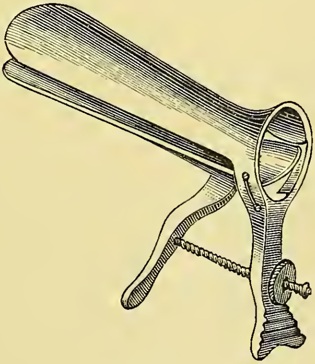

FIG. 82.
CUSCO'S SPECULUM.

The Cusco speculum is self-retaining and useful in cervical and endometric applications.

W. L. Reid of Glasgow has introduced another variety of bivalve speculum which he has found useful. In it the blades are separable and move on parallel bars.

If the patient be placed in the genupectoral or semiprone posture, the posterior vaginal wall hooked back with the fingers and the cervix drawn down with a volsella, a useful view can be obtained without the aid of any speculum.

USES AND COMPARATIVE VALUE OF THE VARIOUS SPECULA.

The Sims is undoubtedly the best and most scientific speculum we possess. When properly used and aided by the volsella or tenaculum, it leaves nothing to be desired. For operative cases its use is imperative; and it is the only speculum which does not distort the split cervix. It is objected by some—on insufficient grounds—that it is difficult to manipulate, requires a skilled assistant, and exposes the patient unduly.

The Fergusson is easily passed, involves only slight exposure, and is good in very minor gynecology. It gives only a limited view of the vaginal walls. The student should note that it brings the flaps of a split cervix together and somewhat conceals the lesion.

The Neugebauer, on the other hand, opens up a cervical split, and may do this so effectually as to give the impression that there is none. The Fergusson and Cusco are *self-retaining.*

CHAPTER XII.

THE UTERINE SOUND.

LITERATURE.

Simpson, A. R.—The Uterine Sound: Ed. Med. Journal, 1882. *Simpson, Sir J. Y.*—Memoir on the Uterine Sound, Selected Obst. Works: A. & C. Black, Edinburgh, 1871.—See *Mundé's* Minor Gynecology and *Thomas* as to Huguier & Lair.

Uterine Sound.

WE shall consider this important gynecological instrument as follows:—

1. Its nature;
2. Preliminaries to its use, contra-indications;
3. Method of use, difficult cases;
4. Employment for diagnosis and treatment;
5. Dangers attending its use;
6. Relation to bimanual and rectal examination.

NATURE.

Nature.

The sound of Sir James Simpson is not only the classical instrument, but, taken all in all, is probably the best. We describe it, therefore, as a type of the instrument, and then consider its modifications.

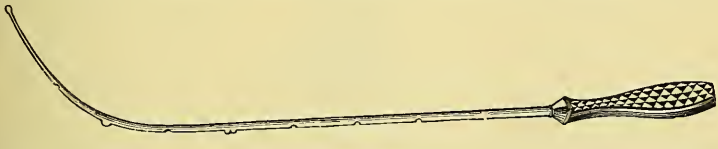

FIG. 83.
SIR J. Y. SIMPSON'S SOUND.

Simpson's sound is a rod of flexible metal 12 inches long, specially graduated, and provided with a suitable handle (fig. 83). It is made of copper, nickel-plated; this is sufficiently pliable to be moulded, and yet sufficiently stiff to retain any special shape given to it. Instrument-makers often make this sound too unyielding. It should be always pliable enough to be bent with two fingers.

The handle has the shape shown at fig. 83. Note that it is roughened on the same side as that towards which the point of the instrument lies. Consequently, when the sound is in the uterus, we can tell the direction of the point by noting this roughness on the handle.

The graduation is important. $2\frac{1}{2}$ inches from the point is a rounded knob: this is the length of the fully-developed unimpregnated uterine cavity. Other markings are 3½ inches, 4½ inches, 5½ inches, and so on up to 8½ inches. The notch, 1½ inches from the point, is of little use and weakens the instrument.

The modifications of this instrument are numerous. The changes are chiefly in its flexibility, lightness, and in the use of another material.

A. R. Simpson has modified the instrument by making it shorter, abolishing the 1½ inch notch, and squaring the handle (fig. 91): this gives a very handy and useful instrument. Sims, Emmett, and Thomas have each a special sound. Thomas' is made of hard rubber or whalebone, and he claims that it is specially useful in the case of submucous fibroids. Other modifications are by Matthews Duncan, Protheroe Smith, Aveling, Jennison and Hanks.

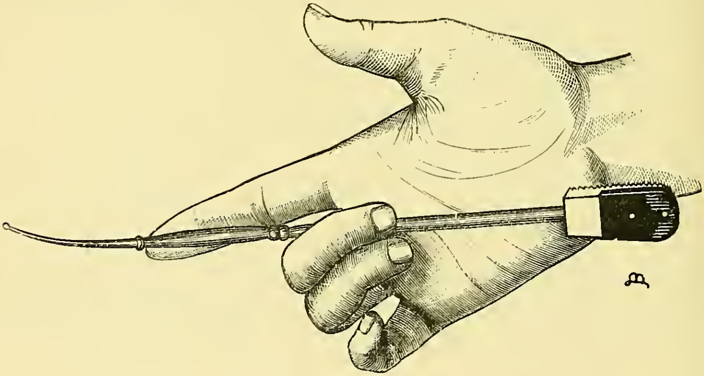

Fig. 84.
A. R. Simpson's Sound.

PRELIMINARIES TO ITS USE: CONTRA-INDICATIONS.

Preliminaries to Use.

No instrument should have the preliminaries to its use more carefully considered. The rash and careless use of the sound may do immense mischief to the patient. Note, then, *when not to use it.*

(1.) The sound is not to be passed during an ordinary menstrual period.
(2.) It is not to be passed in an acute inflammatory attack of uterus, ovaries, pelvic peritoneum, or connective tissue.
(3.) It is not to be passed in cases of cancer of the cervix or body of the uterus.
(4.) It is not to be passed if the patient has missed a menstrual period. This is a safe rule, but admits of limitation, as we shall see afterwards.

Before using it, attend to the following points.

(1.) Ascertain that the patient has not missed a period.

(2.) Do the bimanual carefully. If in doubt, use the rectal examination aided by the volsella.
(3.) Place the patient in the left lateral posture.
(4.) Give the sound the curve you find the uterus to have.

METHOD OF USE.

Method of Use.

After the preliminaries mentioned above, take the sound in the hand, dip its first 3 inches in an antiseptic solution. Pass the index finger of the right hand into the vagina and touch the anterior lip of the cervix, *i.e.*, in front of the os. Guide the sound along the vaginal finger and make the point enter the os uteri (fig. 85). Pass it in for an inch or so, to fix it.

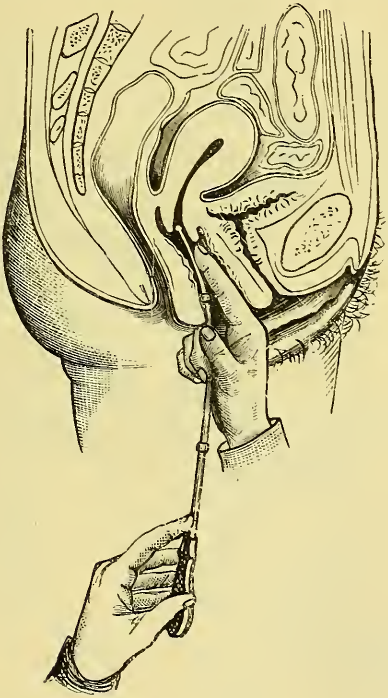

FIG. 85.

FIRST STAGE OF PASSING THE SOUND.

When Uterus Retroverted.

If the uterus be retroverted then carry the *handle* towards the symphysis, when the point of the instrument will glide into the uterine cavity until arrested by the fundus (fig. 86). No force is needed. If force seems necessary, the instrument should be withdrawn and a more careful Bimanual performed.

When Uterus to front.

If the uterus lie to the front, the procedure is different. Pass the sound as already described until it has entered the cervix for an inch or so (fig. 85). Note now that the point of the sound looks back, whereas the fundus lies to the front. Clearly, we must make the point look to the front. This is done by turning the handle so that its roughened surface looks to the front. To do this we do not twist round the handle on its long axis, but make it sweep round the arc of a wide semi-circle as in fig. 87. The point, during this manœuvre, remains fixed or nearly so. Now carry the handle back to the perineum when the point glides into the cavity (fig. 88).

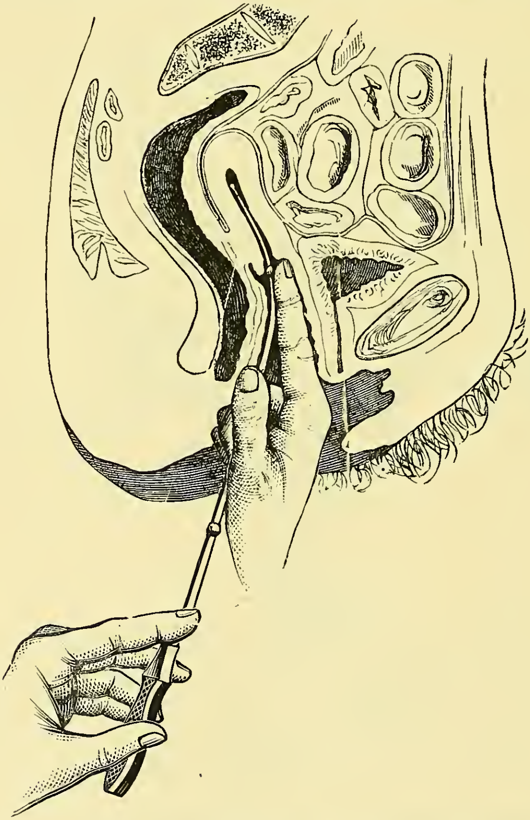

FIG. 86.
SECOND STAGE OF PASSING THE SOUND when UTERUS is Retroverted.

Another way of passing the sound, when the uterus lies *to the front*, is as follows. Place the patient well across the bed. Do Bimanual and curve sound appropriately. Take the sound in the right hand. Pass two fingers of the left hand, palmar surface forward, into the vagina, and touch the posterior lip of the cervix. Carry the sound, point looking forwards, into the vagina; make it enter the os, and then carry the handle towards the perineum, when the point will glide on This method avoids the sweeping round of the handle, and is useful if the uterus is very much anteverted.

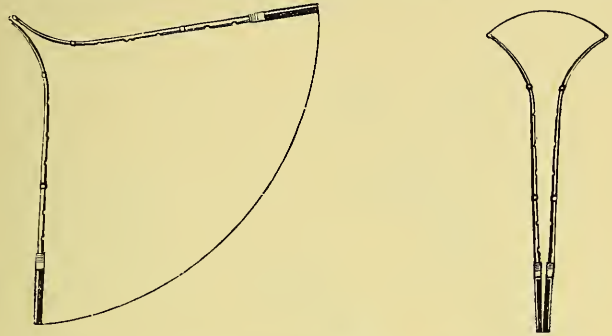

Fig. 87.

(a.) Proper method of Turning the Sound, contrasted with improper method (b.).

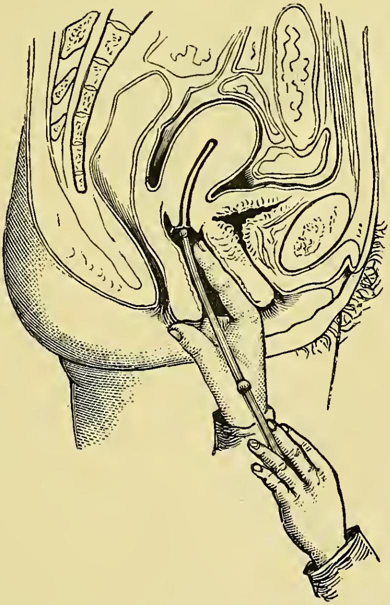

Fig. 88.

Second Stage of Passing the Sound when Uterus is to the Front.

The sound may be passed after the uterus is drawn down with a volsella, or after the Sims speculum has been introduced.

Difficult Cases for Sound.

Difficult Cases.—These are chiefly found in markedly anteflexed uteri. The sound passes in so far (fig. 89), but when turned has its point looking too directly upwards. In such cases first draw the cervix down with a volsella, now pass the sound, and should it still stop at the flexion make pressure with a finger in the anterior fornix to push up the fundus.

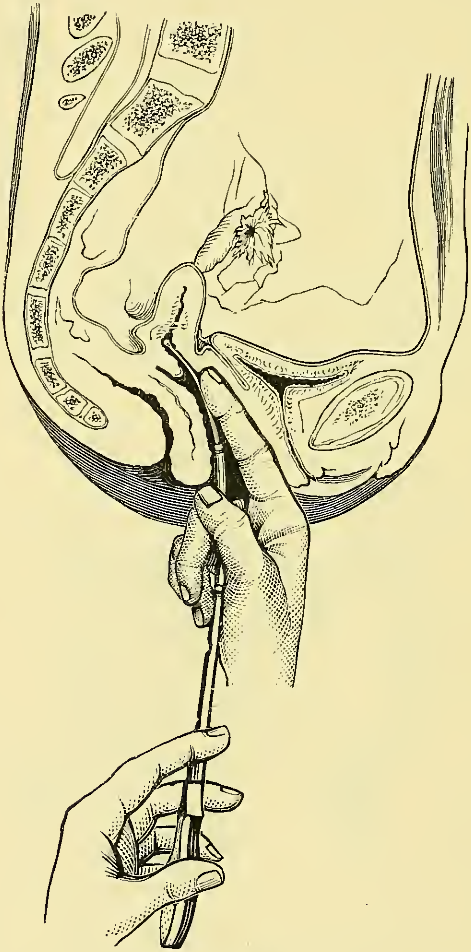

Fig. 89.

Sound arrested (before Rotation) in a case of Anteflexion.

Then get an assistant to carry the handle of the sound towards the perineum.

When the uterine cavity is tortuous as in submucous fibroids a gum-elastic bougie—No. 10—may be used to ascertain its length. Thomas', Jennison's, or Emmet's sound is specially useful here.

EMPLOYMENT OF THE SOUND FOR DIAGNOSIS AND TREATMENT.

(*A*) Diagnosis.

Use of Sound in Diagnosis.

(1.) *Length of uterine* cavity. This varies in different pathological conditions. Thus the cavity is

(*a*) lessened in Superinvolution of uterus,
Atrophic uteri;

N.B.—The sound easily perforates the thin wall of the superinvoluted uterus; this does no harm. It may also pass along the Fallopian tube.

(*b*) increased in Subinvolution of uterus,
Hypertrophy of uterus,
Cervical hypertrophy,
Endometritis,
Submucous fibroids,
Interstitial fibroids,
Small uterine polypi,
Prolapsus uteri.

(2.) *Direction of uterine axis;* whether retroverted, anteverted, lateriverted.

(3.) *Relation* of axis of uterine body to that of cervix; whether we have anteflexion or retroflexion.

(4.) *Stenosis and atresia at os internum and os externum; tenderness of fundus,* as in endometritis.

(5.) *Mobility of uterus.* This should be ascertained in the following way. Pass the sound as already described. Make the patient turn on her back, and then place two fingers in the vagina, palmar surface upwards and touching the posterior lip of the cervix. The sound lies on the palm of the hand, is steadied with the thumb, and can be used to move the uterus gently about as desired.

(6.) *Rough condition of endometrium;* often associated with bleeding when sound is passed.

(7.) *Differential diagnosis between uterine polypi projecting into vagina, and inverted uterus, etc.*—When we have a polypus to deal with, the sound passes in through the cervix for more than the usual distance because the uterine cavity is enlarged. In inversion, it passes for only a short distance into the cervix and is then stopped by its reflexion. Sometimes, however, the neck of the polypus is adherent all round to the cervical canal, thus simulating inversion: and in some very rare cases the mucous membrane of the uterus becomes separated and expelled from the uterine cavity, simulating inversion of the whole uterus owing to the separation stopping at the os internum. It is evident that in these last two cases the Bimanual clears up the diagnosis, the upper hand feeling the body of the uterus in its normal position in both of them. The sound is only confirmatory of the Bimanual.

(*B*) TREATMENT.

Use of Sound in Treatment.

(1.) *Rectification of abnormal angular relation between the uterine body and cervix* (anteflexion, retroflexion); *dilatation of uterine canal as a whole, or of stricture at os internum.*

(2.) *Replacing of retroverted unfixed uterus.*

(3.) *Application of acids to endometrium on the sound covered with cotton wool.*

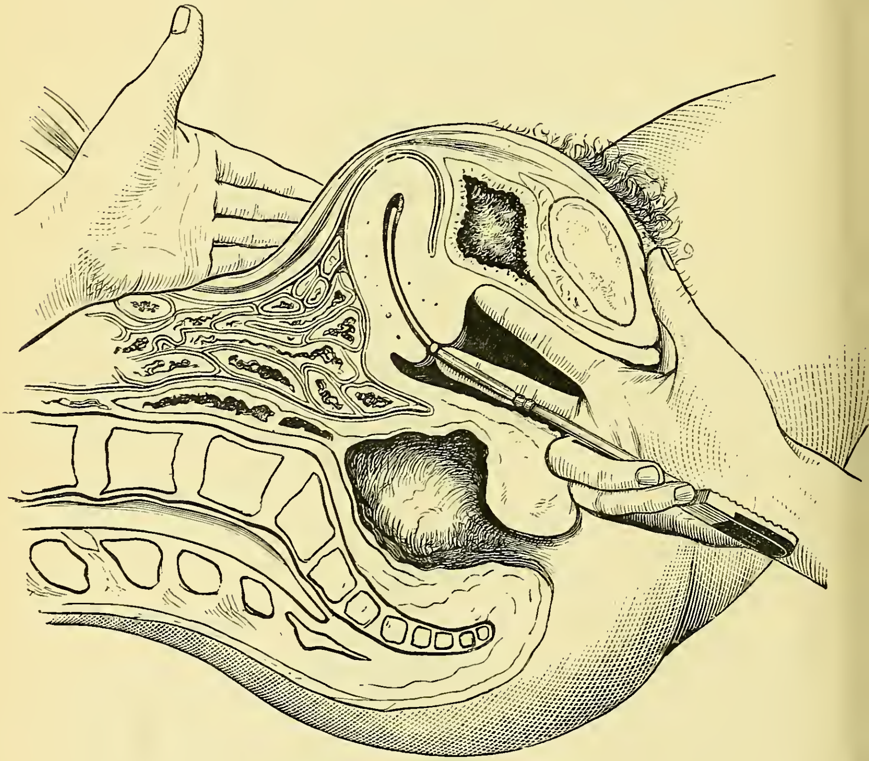

FIG. 90.

SOUND combined with BIMANUAL Examination (*A. R. Simpson*).

DANGERS ATTENDING ITS USE.

Dangers of Sound.

The great dangers to the patient from the passage of the uterine sound are abortion, and abrasion of the mucous membrane with absorption of septic matter and resulting pelvic cellulitis or peritonitis.

The former untoward result must be very carefully guarded against. One valuable caution is never to omit the question as to the menstruation, and to ask if it was the usual amount. Some women have a slight discharge of blood at the first period after they conceive, some even menstruate during the whole period of uterogestation. The best safeguard is the careful performance of the Bimanual. This soon teaches the practitioner to know whether he has an unimpregnated uterus between his hands, or one at the second or third month of gestation. Special care should be taken when the uterus is retroverted: it may be also gravid; and the pregnancy may, by causing pressure, have induced the patient to consult a medical man. As the Bimanual is often difficult, an unwary use of the sound may make the diagnosis disagreeably evident.

The means to avoid setting up any inflammatory disturbance are—to perform the Bimanual carefully, to curve and oil the sound properly, and to pass it gently.

SOUND COMBINED WITH BIMANUAL.

Use of Sound in Bimanual.

The importance of this method of examination has been recently pointed out by A. R. Simpson. For its performance the short sound with the square handle (fig. 84) is necessary. It is of such a length that, when the middle finger is at the knob, the flat surface of the handle rests on the ball of the little finger, against which it is steadied by the flexed little and ring fingers.

The sound is introduced into the uterus in the ordinary way. The fingers are passed into the vagina as for a vaginal examination, and the sound grasped as in fig. 84. Or the sound may be steadied with the middle finger while the index is used to feel the uterus through the anterior fornix (fig. 90). The external hand is placed as in the Bimanual.

This method is specially useful (*a*) when the uterus is flaccid; the sound stiffens it, and enables the external hand to define it: (*b*) when, from the presence of small fibroids or pelvic deposits, there is doubt as to what is the fundus uteri; the sound felt by the external hand in the uterus, indicates the fundus.

RELATION OF SOUND TO BIMANUAL AND RECTAL EXAMINATION.

Relation of Sound to Bimanual and Rectal Examination.

Before Sir James Simpson introduced the use of the sound, gynecological examination was confined to the exploration of the vagina and cervix.

Simpson gave an immense impulse to Gynecology, by placing in the hands of gynecologists an instrument which explored the uterine cavity above the cervix, and enabling them to obtain a perfection of diagnosis before undreamed of; thus gynecological examination came to consist of a vaginal examination, and then a passage of the sound, due attention being given to the non-existence of pregnancy. He recommended, further, the elevation of the uterus with the sound, and its definition with the upper hand.

The next step in Gynecology was the use of the two hands—the bimanual and rectal examinations—which in the last twenty years has developed immensely. Consequently, the use of the sound has become more limited. The teaching in this chapter has been based on a recognition of this fact, inasmuch as the use of the sound is recommended only after the bimanual, rectal, and volsellar examinations have been carefully employed.

CHAPTER XIII.

TENTS AND OTHER UTERINE DILATORS.

LITERATURE.

Hegar und Kaltenbach.—Die Operative Gynäkologie : Stuttgart, 1881. *Landau*—Ueber Erweiterungsmittel der Gebärmutter : Volkmann's Sammlung, No. 187. *Lewers*—On Rapid Dilatation of the Cervix Uteri : Lancet, 1887, II., p. 507. *Mundé*—Minor Gynecology : New York, 1881. *Simpson, J. Y.*—Selected Obst. Works, Vol. I. : Edinr. 1871. *Sims, J. M.*—Uterine Surgery : London, 1867. See also Index of Recent Gynecological Literature in Appendix.

Uterine Dilators.

HITHERTO we have considered only the means which have placed the vagina and cervix within range of digital examination. In this section we take up the methods by which we get digital examination of the uterine cavity—methods of the highest practical value, which, like the sound, we owe to the genius of Sir James Simpson.

We therefore consider the following methods of dilating the cervical canal :—

I. *Slow dilatation with Sponge Tents, Tangle Tents, Tupelo Tents ;*

II. *Rapid dilatation with graduated hard-rubber Dilators—Tait's, Hanks'*, and *Hegar's ;*

III. *Dilatation by incision and screw Dilators* (*v.* Chap. XXVI.).

DILATATION BY SPONGE, TANGLE, AND TUPELO TENTS.

Sponge-tent—material.

1. *Material.*—The sponge tent is a cone of good, unbroken, thoroughly dried sponge, impregnated with some antiseptic, and then firmly compressed into small transverse bulk, its original length being preserved. When thus prepared and placed under conditions where it can absorb moisture, it swells up ; and in thus expanding dilates any dilatable structure which may grasp it.

Good sponge tents of various sizes may be had from all chemists. In order to prevent the antiseptic from volatilizing, the sponge tents are covered with grease. They are provided with a tape at the base to aid their extraction from the cervix after use.

Tents are also made from the ordinary sea-tangle (laminaria digitata) (fig. 91), and from tupelo wood (nyssa aquatilis). It is alleged that the tupelo expands more rapidly than either tangle or sponge. Fig. 92

shows its power in this respect. Tangle tents may be had hollow; this facilitates the imbibition of moisture but weakens their expanding power.

2. *Purposes for which used.*

Uses of Tents.

(1.) To restrain hæmorrhage in cases of abortion, and at the same time dilate the cervix for further interference.

(2.) To dilate the cervix and uterine cavity, and enable the practitioner to ascertain and remove the cause of pathological uterine hæmorrhage, whether due to endometritis, sarcomata, polypi, or incomplete abortion.

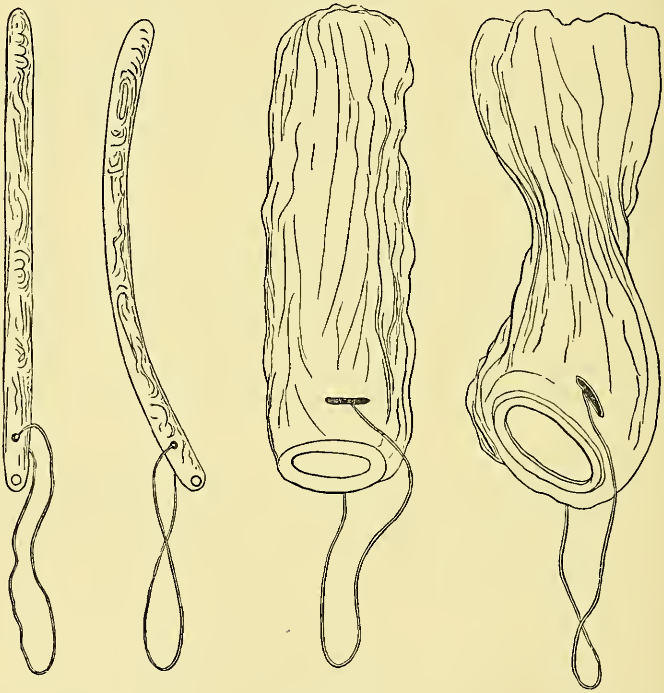

Fig. 91.

Shows on the left a straight and a curved tangle tent, and on the right these tents after expansion. Note how one has been gripped by the os internum (*Mundé*).

(3.) To correct pathological flexions of the uterus, or to dilate a stenosed cervix. Their use for this is not only unnecessary but dangerous.

Scope of Tangle and Tupelo Tents.

Tangle tents have the same scope as sponge tents. They do not, however, expand so well and thoroughly. Their special advantages are due to their smaller size, and the fact that several may be passed at the same time into the cervix. They are specially useful, therefore, in cases of narrow cervix and flexions. Tupelo tents are very good; they are easily passed and, from their rapid expansion, preferable to sponge tents.

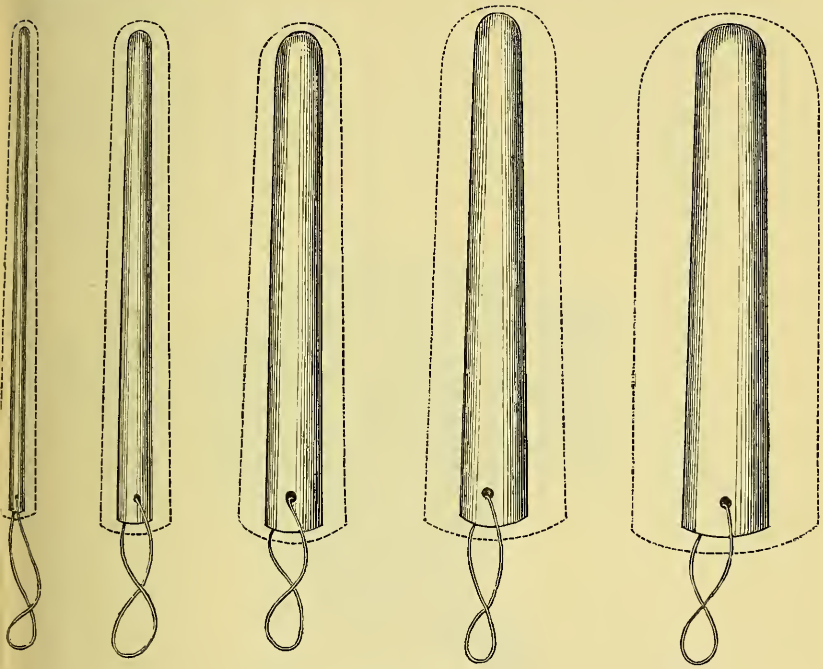

FIG. 92.

DIAGRAM to show relations between size of Tupelo Tent, before and after expansion. The dotted outside line indicates the size of the tent after expansion (*Mundé*).

Preliminaries and Mode of Use.

3. *Preliminaries to and Method of use.*— Tents should not be passed during an ordinary menstrual period, although they often require to be used when pathological bleeding is going on. They should always be passed at the patient's own house; and she should be kept strictly in bed during their use, and for some time after. Before their use, the vagina should be thoroughly washed out with warm carbolic lotion (1-40), or with corrosive sublimate (1-2000). Schultze, in passing tangle tents

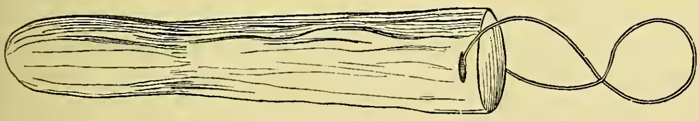

FIG. 93.

EXPANDED TUPELO TENT with constriction at os internum (*Mundé*).

for flexions, first ascertains the uterine curve with the sound; if blood follows its use, he postpones the introduction of the tent for forty-eight hours, in the meantime applying pure carbolic acid to the endometrium. Before using the sponge tent, it is advisable to remove most of the grease covering it.

Sponge tents may be used in various ways.

How passed.

(1.) The patient is placed in the genufacial, or better, in the semi-prone posture. Sims' speculum is passed, the anterior lip of the cervix laid hold of with a volsella and drawn down. The sponge or tangle tent, held in forceps, can then be passed into the cervix (fig. 95).

(2.) The tent is fixed on the spike of an appropriate instrument, and is then passed like the uterine sound; *i.e.*, with the patient placed in the left lateral position, the index and middle fingers carried into the vagina and placed on the anterior lip of the cervix. The tent, fixed on the spike, is passed along these fingers and its point made to enter the cervix. The handle is then rotated and carried to the perineum.

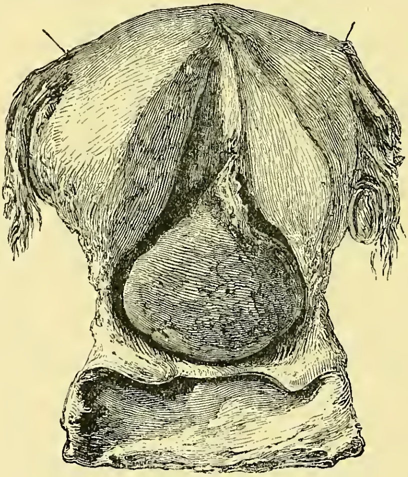

FIG. 94.

SPONGE TENT POLYPUS OF SIR JAMES SIMPSON. ($\frac{1}{1}$)

Drawing of the uterus which contained a polypus—obtained from a patient of Sir James Simpson's, who died from the hæmorrhage it caused. It was this preparation which suggested to him the sponge tent.

(3.) The patient is placed on her left side and athwart the bed. Pass the volsella, draw the anterior lip of the cervix down. The volsella is not always needed. Place the tent between the index and middle fingers of the left hand with the thumb at the base, carry these fingers into the vagina with their dorsum on the posterior vaginal wall, make the point of the tent enter the cervix and push it on with the thumb.

Another way is to use the volsella as above described, but to fasten it to the bed. Then pass Sims' speculum holding it with the left hand, so that the tent held in the right hand can be passed into the cervix without difficulty.

Occasionally, difficulty is experienced in passing a tent, owing to marked anteversion of the uterus. If the cervix be drawn down with a volsella, the difficulty may be overcome; or it may be necessary to partially retrovert the uterus bimanually prior to passing the tent.

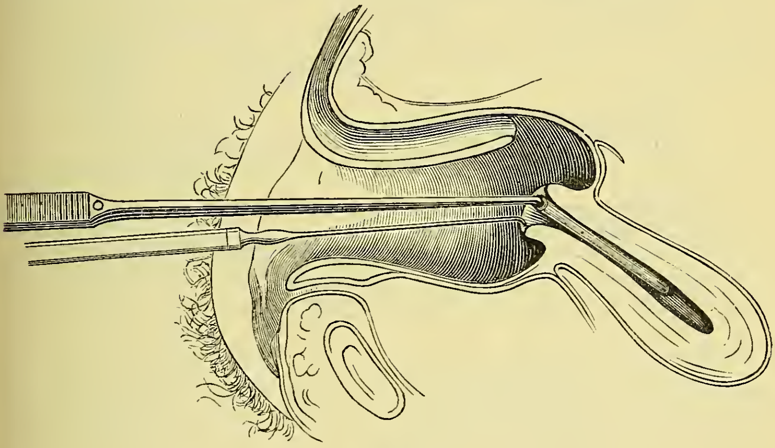

Fig. 95.

Sims' Diagram illustrating Passage of Tangle Tent. Patient is semiprone, Sims' speculum passed, and cervix steadied with tenaculum. The tent is passed with forceps.

Moulding of Tangle and Tupelo Tents.

Tangle and Tupelo Tents.—The same instructions as for sponge tents hold good. Tangle tents, however, when used to correct flexions must first be moulded as follows :—Ascertain the curve of the uterus by bimanual and sound, select a suitable tent and dip it for a few seconds in boiling water, then mould it to uterine curve and pass it as already explained.

Tents require to be left in the cervix for a period varying from 12 to 15 hours, and the vagina should be frequently douched with carbolic lotion during this time. At the end of this period the tent should be removed. During the removal no great force should be used. Sometimes the removal is difficult owing to constriction by the os internum or to irregularities in the mucous membrane.

The cervix is generally then sufficiently dilated to admit of digital examination of the endometrium.

Dangers and Contra-indications.

4. *Dangers of Sponge and Tangle Tents and contra-indications.*—The practitioner must keep prominently before him that the use of a tent may prove by no means a harmless measure. Cases of death from septi-

cæmia after the careful and proper use of *one* tent have occurred. The patient runs a risk proportionate to the number used; and, therefore, it is not advisable to use more than two consecutively unless under special circumstances. They are not to be used if acute or sub-acute pelvic inflammation, pyosalpinx, ovaritis (acute or chronic), carcinoma cervicis, or pelvic hæmatocele be present.

The reason why sponge tents may prove dangerous is only too apparent. The uterine mucous membrane is a lymphatic surface absorbing most rapidly. We cannot insert sponge tents with Listerian precautions; and, in addition, we have the expanding pressure of the tent forcing septic matter into the mucous membrane.

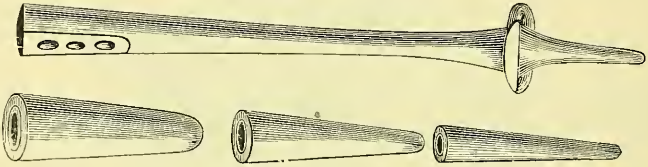

FIG. 96.
TAIT'S DILATORS.

To sum up briefly, tents are highly useful in necessary cases—no means at the disposal of the gynecologist gives him in proper cases such valuable help; but he should not forget the risks occasionally arising from their use—risks which should make him cautious but not timid.

Hard Rubber Dilators—Tait's, Hanks'.

RAPID DILATATION BY GRADUATED HARD-RUBBER DILATORS—TAIT'S, HANKS', HEGAR'S.

The statement already made as to the dangers attending the use of slowly expanding tents would lead one to expect that attempts at rapid dilatation have been made. For this purpose, graduated vulcanite dilators have been employed by Tait, Hanks, and Hegar.

Tait's dilators consist of graduated vulcanite cones (fig. 96) which can be screwed on to a suitable handle. The proximal end of the handle is perforated for elastic bands which, passing in front and behind, are attached to a suitable belt round the patient's waist. Thus the elasticity of the bands causes the cone gradually to pass up into the cervix, dilating it as it goes. By this apparatus, Tait claims to avoid septic infection and to dilate rapidly. The obvious objection is the amount of watching it entails and the absence of the pelvic curve on the handle.

In cases of abortion where the cervix is dilatable, Hanks' dilators seem serviceable. They have the oval shape seen at fig. 97, are graduated in size and screw on to the sigmoid handle. They can be used manually to dilate the cervix until the fingers can be passed through.

Hegar's dilators consist of a series of slightly curved stems $4\frac{3}{4}$ in. to $5\frac{1}{2}$ in. (12–14 cm.) in length, with a short flat handle 2 in. long, numbered from 1 to 30 and with diameters ranging from about $\frac{1}{12}$ in. to $1\frac{1}{12}$ in. (2–30 mm.). There is little doubt that, to prevent sepsis, vulcanite dilators are the best. For dilating the cervical canal quickly in order to explore the uterine cavity with the finger, for the removal of polypi, or for curetting, they are specially indicated and are to be used as follows. In a case, for instance, where the cervical canal is to be dilated in order to gain access for the removal of a polypus, the patient is chloroformed, placed in the lithotomy posture and the vaginal douche employed. Hegar's dilators, which are lying in a solution of corrosive sublimate 1 in 2000, are then passed, until sufficient dilatation is obtained. The polypus is then removed, and the uterine cavity carefully douched.

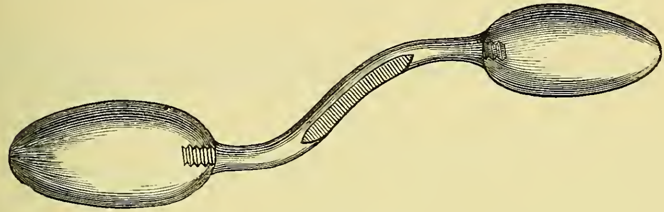

FIG. 97.
HANKS' DILATOR. ($\frac{1}{1}$)

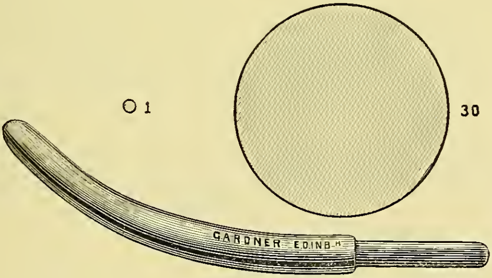

FIG. 97A.

HEGAR'S DILATOR. The lower figure represents the dilator (No. 15) complete, reduced to one-third scale; the two upper figures show cross sections of the smallest (No. 1) and the largest (No. 30) sizes.

We recommend therefore the use of the tupelo tents in cases of threatened abortion where the practitioner has not sufficient assistance to enable him to use the vulcanite dilators. Where, however, this assistance can be procured, especially for exploration, curetting, and endometric applications, Hegar's dilators are the safest and best.

CHAPTER XIV.

THE CURETTE.

LITERATURE.

Mundé—The Dull Wire Curette in Gynecological Practice: Ed. Med. Jour., XXIII., p. 819. *Recamier*—Memoire sur les Productions Fibreuses et les Fongosités Intra-utérines: Univ. Med., 1850. *Simon*—Die Auslöffelung breitbasiger weicher sarkomatöser und carcinomatöser Geschwülste aus Körperhöhlen: Beiträge zur Geburtshülfe von der Gesellschaft in Berlin, 1872. *Sims, J. Marion*—Clinical Notes on Uterine Surgery: London. *Thomas*—Diseases of Women: London, 1882.

Curette.

THE curette is an instrument, provided with a cutting or a dull edge, which can be introduced into the uterine cavity (previously dilated by tents if necessary) for the purpose of scraping off or removing abnormal endometric granulations, sarcoma of the mucous membrane, carcinoma of the cervix, or the remains of an incomplete abortion. This instrument has had a somewhat chequered career. Originally introduced by Recamier, whose instrument was stiff and sharp, it did good work in some cases; but fell into disrepute, undoubtedly deserved, after the record of certain instances where its use had caused perforation of the uterus. Marion Sims and Simon recommend a modified instrument which, owing to its stiff unyielding nature, did not at first find much favour with the profession. Thomas then introduced his flexible dull wire curette, but this has now been found too feeble and a return has been made to stronger instruments.

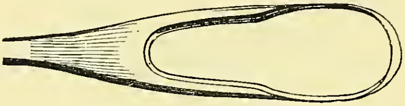

FIG. 98.
LOOP OF RECAMIER'S CURETTE. ($\frac{1}{1}$)

There are four varieties of curette—(1.) Recamier's (fig. 98); (2.) Simon's (fig. 99); (3.) Thomas' (fig. 100); (4.) Martin's (fig. 101). Of these we recommend Martin's.

Uses of Curette.

Cases in which the Curette is useful.—The curette may be used to remove a piece of intrauterine tissue for aid in diagnosis. It is most frequently employed to remove abnormal tissue, in abortion, sarcomatous or carcinomatous diffuse growth, and endometritic conditions.

Method of Use.—We take curetting for incomplete abortion as a type of procedure. The instruments necessary are Sims' speculum, volsella, Hegar's dilators, sound or probes armed with cotton wool, and Fritsch's uterine double catheter (fig. 110). The instruments are placed in carbolic lotion (1–20) or in biniodide of mercury (1–2000). The patient is placed semiprone or, if chloroform is given, in the lithotomy posture: the speculum is passed and the cervix steadied with a volsella. Hegar's dilators are now introduced until the cervical canal is patulous enough to admit the index finger. The curette is then employed by being passed systematically over the anterior and posterior surfaces from above downwards. No force is required, and the finger can make out by the feeling of the curette when the resistant muscle is reached.

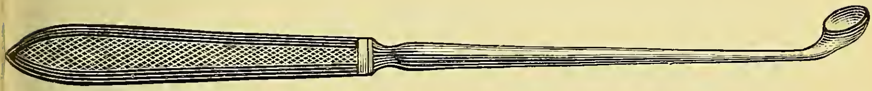

Fig. 99.
Simon's Spoon. ($\frac{2}{3}$)

Simon's Spoon.

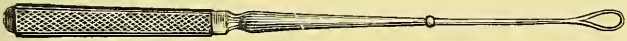

Fig. 100.
Thomas' dull wire Curette, with knob added by A. R. Simpson. ($\frac{1}{3}$)

Thomas' Curette.

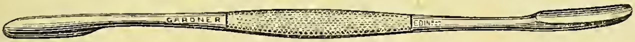

Fig. 101.
Martin's Curette.

Martin's Curette.

The cavity of the uterus is then washed out with a mercurial lotion, and pure carbolic acid applied.

Cautions and dangers.—The same precautions should be used as given under sponge tents. The dangers have proved in the authors' hands slight, a minor attack of pelvic peritonitis being the worst.

Cautions and Dangers.

RELATION OF POSTURE TO EXAMINATION AND TREATMENT.

We have already mentioned several postures as being the proper ones for certain manipulations; and we here sum up briefly what it is of use to know in regard to these.

The *lateral posture*, where the patient lies on her side in the ordinary way, is convenient for vaginal examination; for the use of Fergusson's, Neugebauer's, or Cusco's speculum, and the passage of the sound and catheter.

The *dorsal posture* is imperative for abdominal examination and the bimanual.

The *semiprone* is the best posture for passage of Sims' speculum or for vesico-vaginal fistula operation.

The *lithotomy posture* is specially valuable for operations on the perineum, vaginal walls, cervix and uterus.

The *genupectoral posture* is used in replacement of the retroverted uterus.

CHAPTER XV.

KNIVES; SCISSORS; NEEDLES; SUTURES; DOUCHES AND SYRINGES; CAUTERY; ANÆSTHETICS.

KNIVES.

Knives.

For perineal operations, the surgeon's ordinary straight bistoury is sufficient. For vaginal and cervical surgery, long-handled knives with the blade straight or at an angle to the shaft are required (*v.* under operation for vesico-vaginal fistula).

SCISSORS.

Scissors.

These are of the greatest use to the gynecologist and in many instances supersede the knife. Straight sharp-pointed scissors are valuable in repair of the perineum. Curved scissors are necessary for fistula cases (fig. 102), Bozeman's being specially good. They are right and left, but no woodcut gives a proper idea of their curves. For cervical operations, stout and sharp scissors are necessary. It is very important to remember that the vaginal portion of the cervix is exceedingly tough, and that the ordinary scissors in dividing it slip down or even turn obliquely, leaving the tissue uncut. Kuchenmeister's scissors have this tendency obviated by one of the blades being hooked (fig. 103). Even these scissors sometimes prove unsatisfactory, as the finger-and-thumb grip they give is not powerful enough. Fig. 104 shows a pair of cervical scissors devised by Hart, where the handles are like those of bone forceps, and are provided with a ratchet. They can, therefore, be grasped in the

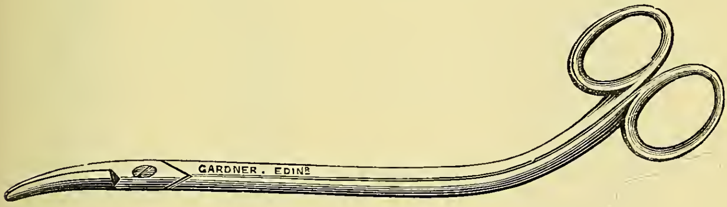

Fig. 102.
Simple Curved Scissors.

palm of the hand while being used, and cut even the densest cervix with great precision. Scissors are highly useful in perineal, vaginal, and cervical operations.

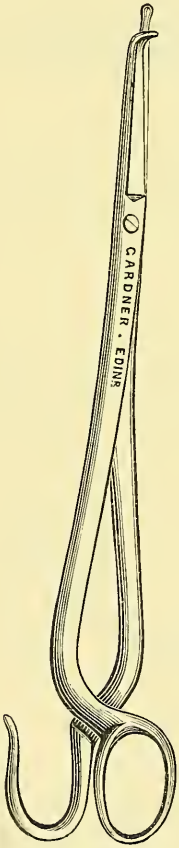

Fig. 103.
Kuchenmeister's Scissors.

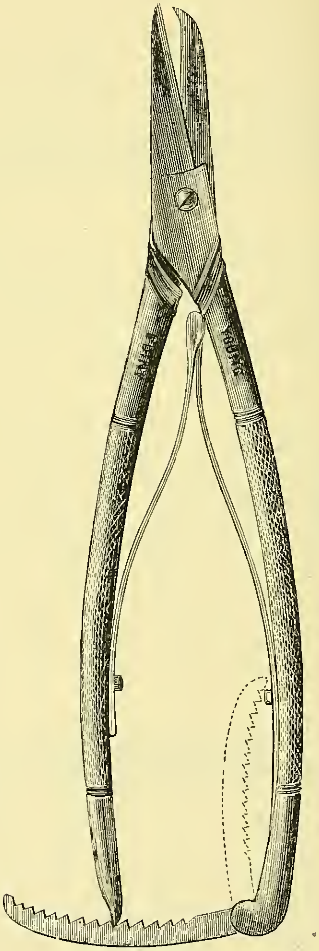

Fig. 104.
Hart's Cervical Scissors.

NEEDLES.

Needles. We need only note that for cervical and fistula operations strong short needles either curved or perfectly straight are needed. The cervical tissue is so dense that markedly curved needles snap when slight.

They are passed with a needle-holder, of which fig. 106 shows a simple form. Curved or tubular needles set on handles are also useful. Needle Holders.

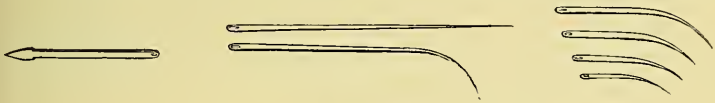

FIG. 105.
FORMS OF NEEDLE (*Emmet*).

Hagedorn's needles are flattened laterally and full-curved. A special needle-holder is necessary for them.

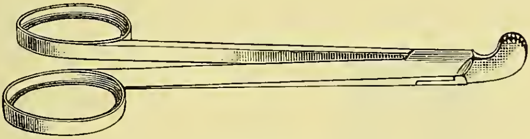

FIG. 106.
NEEDLE-HOLDER.

SUTURES.

These may be silver wire, carbolized silk, catgut, silk-worm gut, or horse-hair. For fistulæ, deep stitches, and cervical lacerations, *silver wire* or *silk* is used. For perineal operations, for superficial stitching, as also for stitching the ovariotomy incision, *silk-worm gut* is good. *Catgut* is valuable in the rectal stitches of complete rupture of the sphincter ani; and is now largely used instead of silk for operations on the cervix, vagina, and perineum, as it obviates the necessity of removing the stitches afterwards. *Carbolized silk* (thin and fine) is best for the ovariotomy pedicle. *Horse hair* is useful for superficial skin stitches.

VAGINAL SYRINGES AND DOUCHES: UTERINE DOUCHE.

For the purpose of applying antiseptic and astringent lotions to the vagina and split cervix, for hot-water injections, and for merely cleansing

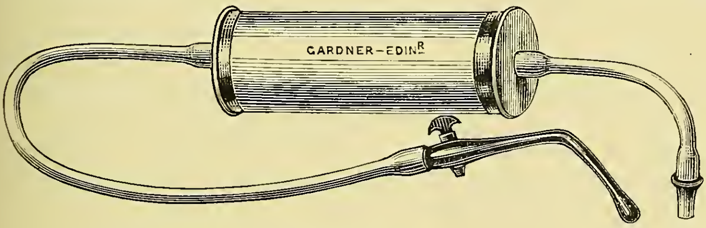

FIG. 107.
HIGGINSON'S SYRINGE.

purposes, the vaginal syringe and douche are employed.

Vaginal Syringes.—Fig. 107 shows the well-known Higginson syringe. Vaginal Syringe.

Valuable as this is, it is difficult for ordinary patients to manage single-handed. For them we should therefore recommend the

Vaginal Douche.

Vaginal Douche.—A convenient form of this is shown at fig. 108. It can be hung up after being filled, and a gentle flow is thus obtained by gravitation. The overflow from the vagina is received into any suitable receptacle on which the patient sits.

For patients in bed its use is equally easy. The nurse or attendant should be instructed to make the patient lie on her back, her hips being well raised with a pillow. The pillow itself should be covered with a waterproof or folded blanket. An ordinary basin is then slipped below the hips to receive the overflow.

Instead of the douche, a simple tube working by syphon action may be employed. This consists of a "sinker," a long piece of gutta percha tubing with a bent piece of glass tubing inserted so as to render it rigid where it passes over the edge of the vessel containing the fluid, and a terminal vaginal tube. The "sinker" should be large and hollow, so that when inverted it may serve as a cup by which the tube may be filled with water; once filled, the tube is temporarily compressed while the sinker is being dropped into the jug or pail full of water ready for use.

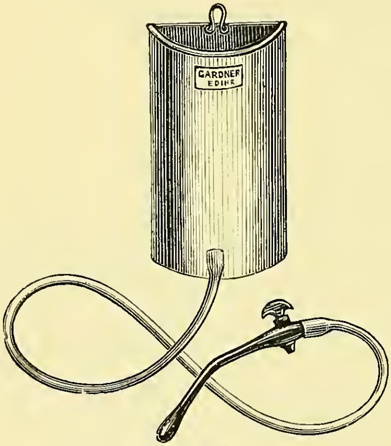

Fig. 108.
Vaginal Douche.

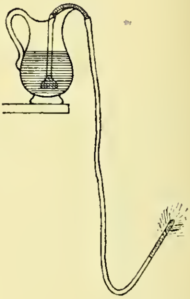

Fig. 109.
Syphon Douche.

The great advantage of the douche is its simplicity. Half of the women who buy a Higginson do not know how to use it, and find it troublesome even when they do know.

Medicated Injections.

The material for injection is various. Hot water, as hot as the patient can bear it, is invaluable in inflammatory conditions.

Hot carbolic lotion (equal parts of boiling water and 1—20 lotion) is admirable for cleansing purposes in abortion cases.

In leucorrhœal conditions, injections of alum (ʒj to oj), sulphate of copper (ʒss to oj), sulphate of zinc (ʒss to oj) are good. The general formula for these is—

℞ Aluminis
vel
Cupri Sulphatis,
vel
Zinci Sulphatis ʒj.
Fiat pulv; mitte tales xij.
Sig. To be used as directed.

The patient is told to dissolve one powder, or half of one, in a pint of water, to place this in a douche and use as already explained.

It is a good plan to make the patient first douche with hot water and then finally, in the dorsal posture, to end with the special lotion. After it is finished the dorsal posture should be maintained for ten minutes, and the last of the injection expelled by sitting up.

Uterine Douche.

The *Uterine Douche* is to be employed only after the cervical canal and uterine cavity have been so far dilated as to admit the index finger.

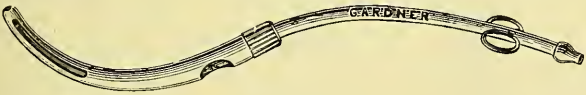

FIG. 110.

FRITSCH'S CATHETER FOR WASHING OUT THE INTERIOR OF THE UTERUS.

An ordinary vaginal douche or Higginson syringe may be employed; if the former, a clean catheter is substituted for the vaginal tube; with the latter, it is best to place the catheter at the one end of a long piece of indiarubber tubing, the other end of the tubing being attached to the syringe. In giving a uterine douche after the removal of abortion or fibroid polypus, the vulva and vagina should first be thoroughly douched. Care must be taken to give the uterine douche gently and slowly, allowing free exit of the fluid, and carefully excluding air from the apparatus. The size of the uterine tube should never be such as to fill the cervical canal. The best uterine tube is Fritsch's (fig. 110), or some of its modifications, as the double canula entirely obviates any retention of fluid. Passage of the fluid through a patent Fallopian tube into the peritoneal cavity is one of the risks but can usually be avoided by giving the injection gently.

The uterine douche is used once only, immediately after the operation, unless septic symptoms arise. In the after treatment, the vaginal douche is sufficient.

CAUTERY.

Cautery—Paquelin's.

The ordinary cautery may be employed in the treatment of the pedicle in ovariotomy. Details are postponed till that subject is considered.

In the well-known Paquelin's cautery, the vapour of benzoline is pumped through a slender, hollow cone of platinum, which has been previously heated in a gas flame or spirit lamp. It speedily becomes red or white hot by the combustion of the vapour, and can then be used.

Note as to its use: (1) To be careful with the benzoline as it is exceedingly inflammable; (2) To heat the platinum cone first (in outermost zone of the flame) before pumping in the benzoline. If the vapour is pumped in before the platinum is hot enough to ignite it, the cone is cooled by its cold stream.

The cautery should be used at a dull heat. When white hot it causes bleeding, because it thoroughly burns the tissues and thus leaves no char to act as a hæmostatic.

When used to cauterize the cervix, care is necessary that the hot metal rod does not touch the vaginal walls. Various plans have been tried to prevent this accident. Thus the rod may be covered except at its terminal two inches with a wooden case which must not touch the metal. Fig. 111 shows some of the various rods of Paquelin's cautery.

ANÆSTHETICS.

LITERATURE. *Brunton, T. L.*—Remarks on One of the Causes of Death during the Extraction of Teeth under Chloroform: Br. Med. J., II., 1875, p. 395. *Chiene*—Chloroform: London Practitioner, January 1877. *Hart, D. B.*—On Death from Insufficient Administration of Chloroform: Ed. Med. J., 1879. *Lister*—Chloroform: Holmes' System of Surgery, Vol. V. *Report* of Br. Med. Ass. Committee: Br. Med. J., Vol. I., 1879. *Murray, R. Milne*—The Cessation of Respiration under Chloroform and its Restoration by a new method: Edin. Med. J., 1885. See also Index of Recent Gynecological Literature in the Appendix.

Anæsthetics.

THE chief anæsthetics are chloroform and ether. Other agents or mixtures have been tried—viz. ethidene; mixtures of alcohol, ether, and chloroform; nitrous oxide; bichloride of methylene: the results have not been satisfactory with these. In the British Medical Report on the action of anæsthetics, ethidene is strongly recommended. Chloroform and ether, however, still remain our most trustworthy agents.

Action of Chloroform.

Action of Chloroform.—Chloroform when administered to a patient has a perfectly definite effect on the nervous system. Sensation is first abolished, and then reflex action. This is all the effect wished for in any case. If, however, the chloroform be pushed further, the respiratory centre becomes paralysed so that breathing ceases; and finally the heart stops from paralysis of its ganglia. In almost all cases this is the *sequence in the susceptibility* to chloroform of the parts of the nervous system regulating sensation, reflex action, respiration, and the circulation. Rarely have we the heart affected before the respiratory centre. When first administered, it causes a transient rise in the blood pressure; and then a gradual irregular fall. The more recent investigators on this point (see the British Medical Report) found that in dogs chloroform reduced the blood pressure more rapidly and to a greater extent than ethidene, and that ether did not cause any appreciable depression. As the blood pressure is the resultant of the force and frequency of the heart's action and the state of dilatation of the small blood-vessels, it is evident that chloroform when administered to dogs slowed the heart and weakened the vasomotor centre more than ethidene or ether. It should

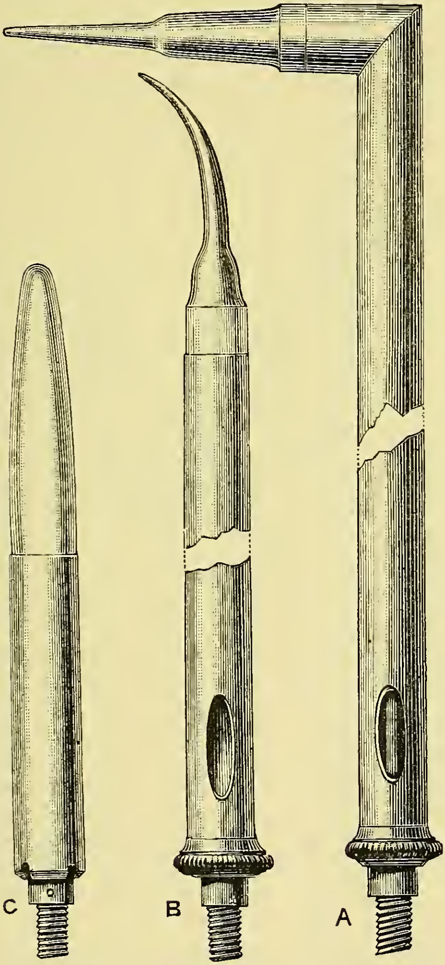

FIG. 111.
VARIOUS FORMS OF PAQUELIN'S CONES. *A* rectangular; *B* curved; *C* straight.

be kept in mind, however, that dogs are very susceptible to the action of chloroform and easily killed by it.

Death not always due to over-dose.

It is wrong to suppose that in every death under chloroform the fatal result is caused by an over-dose, or by the action of the drug on a fatty heart. This is a very common view, but an exceedingly erroneous one.

To prevent the patient's feeling, though one of the most gratifying results of anæsthesia, is not by any means *the* great object in operative cases. One of the most essential aims of its administration is to prevent the reflex transmission of powerful nervous impulses from the part operated on to the heart, or their direct transmission to the respiratory or vasomotor centres. If chloroform be administered to a limited extent so that sensation alone is abolished, and any large nervous trunk like the Fifth, or large nervous area like the splanchnic, be irritated, then we may have reflex inhibition of the heart or paralysis of the vasomotor and respiratory centres; in man, death may result. There are reliable clinical reports that this reflex inhibition of the heart has caused its stoppage in man. It is sometimes urged against this that no amount of stimulation of the lower end of the cut vagus in a rabbit can permanently stop its heart; in man, however, the conditions are not the same as in the rabbit. Goltz, quoted by Lauder Brunton, gives some most interesting facts in this connection. A frog was decapitated, its heart exposed, and the animal hung with its legs downwards. On tapping the intestines pretty hard, the heart stopped through reflex inhibition of the vagus but soon resumed again. It contracted vigorously but had no blood in it to propel. The irritation of the splanchnics had not only inhibited the heart but so lowered the tone of the vasomotor centre that the veins of the abdominal cavity were widely dilated; and thus the blood, when the animal was vertical, did not reach the opening of the inferior vena cava into the right auricle. When the frog was laid on its back, however, the blood flowed at once to the heart.

This then gives us the proper view of the administration of chloroform in all cases where cutting operations or operations involving large nervous trunks are being performed: *the chloroform must be pushed until sensation and reflex action are abolished, and this state is to be kept up during the operation.*

Uses.

Uses.—Chloroform is used in all cutting operations except very slight ones; where the straining of the patient prevents the manipulation necessary for accurate diagnosis and treatment; in phantom tumours; and also, when necessary, in cases where vaginal examination of virgins is indicated.

In division of the cervix, curetting of the endometrium, and application of caustics to the endometrium, it is unnecessary unless the patient is unusually sensitive.

Method of Admini-stration.

Method of administration.—The patient should have no food for three or four hours prior to the operation. Just before the administration of chloroform is begun, half a glass of wine or brandy may be given.

The patient lies on the back with all fastenings unloosed, and should not sit up. A towel or napkin folded square is taken and chloroform poured on it. Fig. 112 shows a convenient and economical drop-cork which can be fitted into any bottle. The amount does not matter. We judge of the amount of chloroform required not by the quantity poured on the cloth but by the effect on the patient. If reflex action be not abolished, even though a quart has been used, the patient has not had enough; while if respiration be affected after a few whiffs, she has had too much.

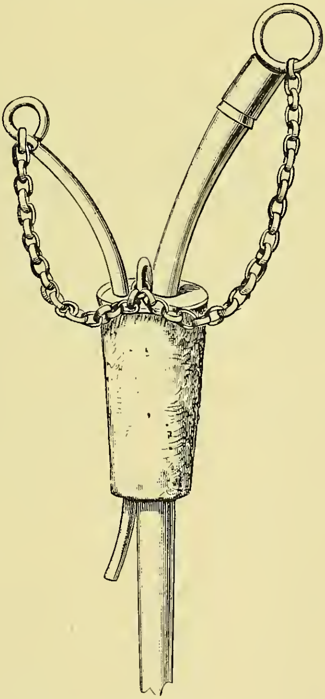

FIG. 112.
CHLOROFORM DROP CORK.

The face of the patient should look to the side, and the chin should be kept well away from the sternum. The administrator keeps the chin forward with his right hand. This has the additional advantage of allowing him to feel the puff of the breath on the palm.

The cloth is to be held not too closely over the face and the patient directed to take long breaths.

The administrator has to keep two points before him. He is to watch the breathing most narrowly, and to ascertain when reflex action is abolished.

He can watch the breathing well by feeling the puff of the breath constantly on his hand. The abolition of reflex action is generally tested by touching the conjunctiva; when the patient is not fully under, the orbicularis contracts. This is not a perfect test, but the best we have.

When reflex action is abolished, no more chloroform is to be given; should it show signs of returning, fresh chloroform is put on the cloth.

DANGERS.

These are the following :—

Dangers.

(1.) *Asphyxia ;*

(2.) *Reflex inhibition of heart or respiratory or vasomotor centres.*

(1.) *Asphyxia.*—This may arise early from fainting, muscular relaxation allowing the tongue to fall back on the pharynx; or from closure of the glottis, owing to paralysis of its intrinsic muscles. The marked extension of the head already insisted on prevents the former from happening. If it arise, the tongue is to be pulled well forward with a pair of forceps. Foulis recommends that the tongue be pressed forward by a spatula or spoon applied at its root.

When asphyxia arises from paralysis of the respiratory centre owing to an overdose of chloroform, the treatment is immediate stoppage of the administration of the chloroform *and artificial respiration by Sylvester's or Howard's method for hours if necessary.* The head should be kept hanging over the edge of the table, so as to send blood to the respiratory centre; or the patient may be inverted (Nelatonized). Recently, Milne Murray in an elaborate research has pointed out the interesting practical fact that artificial respiration must in the first place send more chloroform through the system, inasmuch as the lung is charged with chloroform vapour. He therefore advocates aspiration of the chloroform vapour from the lungs prior to beginning artificial respiration. For this purpose he recommends that a gum elastic catheter, provided with a conical collar to fit the glottis, be passed into the trachea and the air be sucked by the administrator from the lungs. When this has been done several times the tube should be partially withdrawn so as to remove the conical collar from the glottis, and perflation employed : *i.e.*, the chloroform vapour is still sucked from the lung, but air now passes in between the tube and trachea, and thus a current is established. When all traces of chloroform vapour have disappeared, ordinary artificial respiration should be practised.

Reflex Inhibition.

(2.) *Reflex inhibition of the heart or respiratory or vasomotor centres.*—This can only happen when there has not been given sufficient chloroform to abolish reflex action. It is by no means an uncommon thing, therefore, for the patient to die because sufficient chloroform has not been administered; sensation alone had been abolished when the operation began. The usual account is that "the patient gave a start when the first incision was made, and died." In some cases this has happened after only a teaspoonful had been poured on the cloth. Yet this is often called "a death from chloroform."

Contra-indications.

Contra-indications.—Every patient on whom an operation is to be performed may have chloroform; if the operation is indicated, so is chloroform. If the patient has a weak heart, then chloroform is imperative for any major operation; it must be given till reflex action is abolished, as reflex inhibition of the heart is specially dangerous here.

Vomiting.

Occasionally, chloroform causes severe vomiting after the operation. For this reason Keith always uses ether. Vomiting during the operation is dangerous only when any solid matter regurgitates back into the trachea; tracheotomy may then be necessary.

Sickness after the operation is treated by the sucking of ice and the application of a mustard leaf to the pit of the stomach.

Cocaine,* introduced by Koller as a local anæsthetic, is coming to be much used in Gynecology, especially in the removal of urethral caruncles, Emmet's operation, ligature of piles, and plastic operations on the perineum. A solution of the hydrochlorate (4—20 p. c.) is the one usually employed.

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* See T. L. Brunton—Pharmacology, Therapeutics and Materia Medica: London, 1885. Many papers on the use of Cocaine in Gynecology will be found under "Anæsthesia" in the Index of Recent Literature in the Appendix.

CHAPTER XVI.

RELATION OF MICRO-ORGANISMS TO GYNECOLOGY: ANTISEPTICS.

LITERATURE.

Barbour—Puerperal Septicæmia: Edin. Med. Journ., Nov. 1885; Discussion, Feb. 1886. *Bockhart*—Beitrag zur Ætiologie und Pathologie des Harnröhrentrippers: Vierteljahrschrift f. Derm. 1883, Heft 1. *Brunton, T. L.*—Pharmacology, Therapeutics, etc.: London, 1885. *Bumm*—Beitrag zur Kenntniss der Gonorrhoe der weiblichen Genitalien: Arch. f. Gynäk., Bd. XXIII. S. 327. *Cheyne, W. W.*—Antiseptic Surgery: London, 1882. Manual of the Antiseptic Treatment of Wounds: London, 1885. *Davaine*—Recherches relatives à l'action des substances antiseptiques sur le virus de la septicémie: Com. Rend. Soc. de Biolog., Tom. I., 6th Series, p. 25. *Dougall*—On the Prevention of Putrefaction and the Destruction of Contagia: Glasgow Med. Journal, Vol. VII. *Klein*—Micro-organisms and Diseases: Lond. 1884. *Koch*—Article "Ueber Desinfection" in Mittheilungen aus dem kaiserlichen Gesundheitsamte: Berlin, 1881. *La Place*—Säure Sublimatlösung als desinficirendes Mittel und ihre Verwendung in Verbandstoffen: Deutsch. Med. Woch., Leipz., 1887, XIII., 866. *Lister, Sir J.*—On Corrosive Sublimate as a Surgical Dressing: Lancet, 1884, p. 223. *Lomer*—Our present Knowledge of the Relations between Micro-organisms and Puerperal Fever: Am. Journ. of Obstet., Vol. XVII., p. 673. *Lusk*—Nature, Origin, and Prevention of Puerperal Fever: Intern. Congr. Tr., 1876. Also article "Puerperal Fever" in Pepper's Practical Medicine, 1885. *Neisser*—Die Mikrokokken der Gonorrhoe: Deutsch Med. Woch. 1882, No. 20, S. 279. *Petit*—Sur les substances antifermentescilles: Comptes Rendus de l'Academie des Sciences, 1872. *Russell, J. A.*—Article "Disinfection:" Quain's Dict. of Medicine, 1883. *Stadfeldt*—Sind als Desinficiens in der Geburtshülfe Sublimatlösungen der Karbolsäure vorzuziehen: Centralbl. f. Gyn. 1884, No. 7. *Tarnier*—Contribution to Discussion on Spiegelberg's paper on "Antisepsis in Geburtshülfe:" Transactions of London Intern. Congress, Vol. IV., 1881, p. 390. *Woodhead, G. S.*—Notes on the use of Mercuric Salts in Solution as Antiseptic Surgical Lotions: Proc. of Roy. Soc. Edinr, 1888. v. also Reports of Laboratory, R.C.P.E., 1888. *Woodhead and Hare*—Pathological Mycology: Edinr. 1885. *Ziegler*—Pathologische Anatomie, Bd. II. S. 805. The U.S.A. Catalogue gives full references under Antiseptics and Disinfection. See also Index of Recent Gynecological Literature in the Appendix.

RELATION OF MICRO-ORGANISMS TO GYNECOLOGY.

Relations of micro-organisms to Gynecology.

THE recent advances in regard to the part played by micro-organisms in the etiology of disease have not been shared, to any great extent, by Gynecology. Steurer, who investigated an epidemic of puerperal fever at

Strassburg, found cases with diphtheritic patches about the vulva; and from these traced bacteria into the connective-tissue spaces where their presence gave rise to cellulitis; from the spaces, they entered the lymphatics causing lymphangitis. Klebs, who terms the bacteria found in a wound "microsporon septicum," traced their extension (with or without the aid of wandering white blood-corpuscles) from serous membranes into the connective tissue and noted their penetration through the eroded wall of a vein. Recklinghausen found the lymphatics of the skin, at the edge of an erysipelatous patch, filled with bacteria.

Gynecologists have thus been led to suspect that *pelvic peritonitis* and *cellulitis*, as well as *septicæmia* following operations, are all caused by micro-organisms or their products; but as yet the definite proof of this, as formulated by Koch, has not been forthcoming. Although many authors have pointed out that various micro-organisms have been found in the tissues after death from such diseases, yet the four criteria demanded by Koch have not been satisfied. These are the following: (1) The micro-organisms must be present in the tissues or blood-vessels of the diseased animal or man, and in that disease only; (2) a pure cultivation of these must be obtained; (3) inoculation with this must give the same disease to an animal capable of receiving it; (4) in the tissues or blood of this newly affected animal the micro-organisms must be found, and in the same relation to them as in the original disease. Until these are satisfied we shall not reach such demonstration of the relation of micro-organisms to these diseases as we have in the case of splenic fever.

It is to be hoped that the application of the processes now known to pathologists will solve this problem.

In *Gonorrhœa*, however, by the researches of Neisser, Bockhart, Bumm, and others, special micrococci have been found. Bumm describes these as diplococci (*i.e.* the micrococci are dual), half cylindrical, and measuring in length 2·2–2·5 μ. Not only have the micrococci described by Neisser been isolated so as to give a pure cultivation, but gonorrhœa has been caused by an inoculation with this (Bockhart).

Advances have also been made in our knowledge of tubercular diseases, as the bacillus tuberculosis has been found in peritonitis and Fallopian-tube disease.

ANTISEPTICS.

Antiseptics.

By an Antiseptic we understand an agent capable of destroying or inhibiting the growth of the septic or pathogenic micro-organisms.

Formerly, the evidence of the antiseptic properties of any substance was considered sufficient if it kept a wound free from fœtor and caused no blackening of the protective at the wound. Owing however to increased knowledge as to the nature of micro-organisms arrived at by improved methods of isolation and cultivation on gelatine or peptonised jellies, more exact information has been gained as to the trustworthiness of our many antiseptic agents.

Thus Dougall of Glasgow mixed vaccine matter with carbolic lotion (1–20) and left it exposed for twelve days; he found that it was still capable of producing the usual vaccine pustule. The most elaborate and exact researches have, however, been made by Koch, and his results have been found to tally with subsequent clinical trial.

Koch's method was as follows: he dipped sterilised threads in cultivations of bacilli not containing spores, and others in those containing spores; the former were then immersed in a solution of carbolic acid (1 p. c.) for two minutes, and thereafter placed on some of the materials used for cultivation, and he found they did not grow; the latter (*i.e.* those with spore-bearing bacilli) were however unaffected after being steeped even for two days in a 2 p. c. solution of carbolic acid. Immersion in even a 5 p. c. aqueous solution of carbolic acid did not render the spores incapable of development. 5 p. c. solutions in alcohol and in oil were ineffective on the *spores* even after 70 to 110 days' immersion; similar solutions destroyed the *bacilli* after six days' immersion.

The most powerful germicide was found to be corrosive sublimate, which in weak solutions (1 in 20,000) killed spore-bearing bacilli almost immediately and inhibited their growth when of a strength of only 1 in 30,000. An evident difference exists between micro-organisms in relation to their resistance to antiseptics: bacilli without spores, and micrococci, are readily killed by a 1–20 aqueous solution of carbolic acid, while spores resist immersion in 1–20 carbolic lotion even for days.

Carbolic oil and alcoholic solutions of carbolic acid have proved inefficient as antiseptics and should therefore be discarded in practice.

These researches give a guide in determining what antiseptics we should use but require, as we shall see, to be accepted with some modification.

Activity of various Antiseptics.

The following is taken from a table given by Koch of the activity of various antiseptics. The double underlining means that after that number of days the spores of the bacillus anthracis were taken out of the fluid and found to be no longer capable of development. When the numeral is not so underlined it means that after immersion for the special number of days the spores were still capable of growth.

FLUID.	PERIOD (in days) OF THE IMMERSION OF THE SPORES IN THE FLUID.	REMARKS.
Absolute alcohol	1 3 5 . . . 110	
Æther	1 5 8* 30	*Incomplete growth.
Oil of Turpentine	1* 5 10	*Isolated but well-marked development.
Chlorine water	1 5	
Bromine (2 % in water)	1 5	
Iodine water	1	
Iron chloride	2* 6	*Delayed but well developed.
Sublimate (1 % in water)	1 2	
Thymol (5 % in alcohol)	1 6 10 15	
Salicylic acid (5 % in alcohol)	1 6 10 15	

In regard to thymol and salicylic acid it should be noted that alcoholic solutions were used, which, like oily solutions of antiseptics, are less effective than aqueous ones: *e.g.* an alcoholic is less active than an aqueous solution of iodine.

We must now consider our chief antiseptics from the clinical standpoint.

Carbolic Acid.

Carbolic acid is in many respects one of our most trustworthy antiseptics. A watery solution of 1 in 20 is thoroughly effective except in the case of spore-bearing bacilli, and can be relied on in operative work. From its not acting on metals and having no injurious action on sponges, it is useful for cleaning these as well as for skin cleansing. A solution of 1 in 20 if prolonged in its use has, however, a disagreeable action on the skin and the odour is pronounced.

Corrosive Sublimate.

Corrosive sublimate was recommended in 1874 by Davaine, used by Tarnier in obstetrics prior to 1880, and was very many years ago the favourite antiseptic of the late A. B. Stirling, assistant-curator in the Edinburgh Anatomical Museum, so well known for his freezing-microtome and microscopic work. Since Koch found it the only germicide for the spores of bacillus anthracis, it has come into great prominence.

Solutions of 1 in 2000, 1 in 4000, 1 in 8000 are very effective; it is undoubtedly a valuable addition to antiseptics, as it is rapid in action, very soluble, odourless, and non-irritating to the hands. Its corrosive action on instruments and injury to sponges are the drawbacks to its use.

Some important facts as to the action of corrosive sublimate on soaps and blood albumin must be kept in mind. With ordinary soaps, albumin, or blood, we get insoluble and inert compounds formed. Thus if 5 c.c. blood be added to 50 c.c. corrosive sublimate (1–1000), nearly all the mercury is thrown down as albuminate of mercury. This precipitation of the mercury is prevented however by the addition of tartaric acid or common salt, so that $\frac{3}{4}$ p.c. to 1 p.c. salt solution should be used in making 1 to 1000 corrosive sublimate (Woodhead).

Messrs Duncan, Flockhart & Co. have made a special bottle (containing five ounces) with a cupped glass stopper of one drachm capacity. The solution of corrosive sublimate is of such a strength that one cup added to four tumblers of water (one quart) gives a solution 1 in 2000. This strong solution contains $5\frac{3}{4}$ grains of corrosive sublimate and 3 grains common salt to a drachm of water.

It may be ordered thus :

℞. Lotion. Hydrarg. Perchlor. ℥v.
($5\frac{3}{4}$ grs. of Hydrarg. Perchlor., and 3 grs.
of Sod. Chlorid. to 1 drachm of water).
To be put in a special bottle with cupped stopper.
Sig. Poison : for external use.

Biniodide of mercury is also very effective, and is believed to be better than corrosive sublimate, as it is doubly effective, and does not form insoluble compounds nor corrode metals much. These antiseptics can also be had as compressed pellets made up with tartaric acid in the case of the corrosive pellets. These are useful for the practitioner, and prevent mistakes on the part of nurses. Tartaric acid should not be added to the strong solutions of corrosive as it converts the latter into calomel in about a fortnight (Dott).

For cleansing the operator's hands or the part to be operated on, or as a douche for a wound, it is very valuable. It is best used with a *glass* vaginal pipe. In regard to the many other antiseptics, we need only mention boracic acid (1 in 30) and thymol (1 in 2000) as serviceable. Hydronaphthol (1 in 2000) is a new antiseptic which is being largely used owing to its being non-poisonous and non-irritating.

Iodoform and other agents will be referred to as occasions for their use arise.

Antiseptics in operations.

The following general directions should be attended to. The operative Gynecologist must be most careful in his attention to *the surroundings* of his patient. The room must be airy, well lighted, and well ventilated ; and the drainage of the house must be perfect. The nurse in attendance must know the principles of antiseptics, and the great importance of cleanliness in her person.

The *Sponges* should be always most carefully looked to. After each operation they should be thoroughly washed in very hot water, and then dried. During the operation, they are to be wrung out of 1–40 carbolic lotion. Care should be taken that they do not become friable.

Instruments should be kept clean, and during an operation laid in shallow trays containing 1–40 carbolic lotion. The *operator* must always prior to an operation cleanse his hands thoroughly with 1–2000 corrosive sublimate; nor should he recently have performed post-mortems or touched cases of erysipelas. Finger nails are to be kept short and the nail brush scrupulously used. Asepticity of fingers or instruments can be tested by touching a sterilized gelatine plate with them after purification with corrosive sublimate. It can then be noted if any growth of micro-organisms happens. This might be done by a practitioner who suspects he is carrying contagion.

The *part to be operated on*, if skin, should be cleansed with turpentine and then with corrosive sublimate 1 in 2000. For unbroken mucous surfaces, a douche of 1 in 2000 is sufficient.

During *perineal, vaginal, and cervical operations* a douche of boracic lotion (1–30) or carbolic lotion (1–40) should play on the part. This not only has an antiseptic value, but by washing away all blood at once gives a good view of parts to the operator.

Antiseptics must be used with intelligence. The too diligent use of strong antiseptics may lead to poisoning; as has occurred with carbolic acid, corrosive sublimate, or iodoform. With ordinary precautions, this will be rare.

All wound discharges should be received into antiseptic media such as carbolic gauze, salicylic wool, or sublimated wood-wool wadding.

All that has been said has to do with the destruction of micro-organisms outside the body, and is therefore only prophylactic. When once they have gained access to the tissues, our power of destroying them is at present *nil*. All we can then do is to prevent their further entrance, and enable the patient's constitution to resist them.

From what has been said as to antiseptics it is evident that an effective, non-decomposable and non-poisonous antiseptic has still to be discovered.

PART II.

DISEASES OF THE FEMALE PELVIC ORGANS.

WE classify the diseases of the female pelvic organs according to the structure which is affected, and devote one section to each group of affections as follows :—

Section III. The Peritoneum and Connective Tissue ;
,, IV. The Fallopian Tubes and Ovaries ;
,, V. The Uterus ;
,, VI. The Vagina ;
,, VII. The Vulva and the Pelvic Floor.

Further, we shall consider under special sections disturbances of the following functions :—

Section VIII. The Menstrual function ;
,, IX. The Reproductive function.

Finally, we shall devote one section to affections of the other pelvic organs :—

Section X. The Bladder and the Rectum.

In an Appendix there will be specially treated Abdominal Section, Electricity in Gynecology, the Systematic Treatment of Nerve Prostration, Hysteria, Case-taking, and Gynecological Literature.

SECTION III.

AFFECTIONS OF PERITONEUM AND CONNECTIVE TISSUE.

Chapter XVII. Pelvic Peritonitis and Pelvic Cellulitis (Parametritis).
,, XVIII. Pelvic Hæmatocele and Hæmatoma: New Growths in the Pelvic Peritoneum and Connective Tissue.

CHAPTER XVII.

PELVIC PERITONITIS AND PELVIC CELLULITIS (PARAMETRITIS).

LITERATURE.

Bandl—Die Krankheiten der Tuben, etc.: Billroth's Handbuch, Stuttgart. *Barnes*—Diseases of Women: London, 1878. *Bernutz and Goupil*—Clinical Memoirs of the Diseases of Women, Vol. II.: New Sydenham Society, Meadow's translation, 1866. *Churchill*—On Inflammation and Abscess of the Uterine Appendages: Dub. J. of Med. Sc., 1843. *Doherty*—On Chronic Inflammation of the Uterine Appendages after Childbirth: Dub. J. of Med. Sc., 1843. *Duncan, J. Matthews*—A Practical Treatise on Perimetritis and Parametritis: Edinburgh, A. & C. Black, 1869. On Albuminuria with Parametritis: Lond. Roy. Med. and Chir. Tr., Vol. LXVII. *Freund, W. A.*—Anatomische Lehrmittel, etc.: Gesellschaft f. Geburtshülfe, Berlin, Band iv. Hft. 1. Das Bindegewebe im weiblichen Becken und seine pathologische Veränderungen, etc.: Gynäkologische Klinik, Strassburg, 1885. *Freund, H. W.*—Ueber die feineren Veränderungen der Nervenapparate im Parametrium bei einfacher und parametritischer Atrophie: Cent. f. Gyn., IX. S. 644. *Heitzmann*—Die Entzündung des Beckenbauchfells beim Weibe: Wien, 1883. *Lusk*—Puerperal Fever: Internat. Cong. Trans., 1877. *MacDonald, Angus*—Three Cases of Parametritis, with observations on its Diagnosis and Treatment: Ed. Med. J., 1880, p. 1060. *Mundé, P. F.*—The Diagnosis and Treatment of Obscure Pelvic Abscess in Women, with remarks on the differential Diagnosis between Pelvic Peritonitis and Pelvic Cellulitis: Archives of Medicine (E. C. Seguin, Ed.), Vol. IV., No. 3. *Noeggerath*—Latent Gonorrhœa especially with regard to its influence on Fertility in Women: Am. Gyn. Tr., Vol. I. *Olshausen*—On Puerperal Parametritis and Perimetritis: New Syd. Soc. Transl., 1876. *Priestley, W. O.*—Pelvic Cellulitis and Pelvic Peritonitis: Reynold's System of Medicine, Vol. V. *Schroeder*—Krankheiten der weiblich. Geschlectsorgane: Leipzig, 1879. *Schultze, B. S.*—Ueber die pathologische Anteflexion der Gebärmutter und die Parametritis posterior: Hirschwald, Berlin, 1875. *De Sinéty*—Gynécologie: Paris 1879. *Simpson, Sir J. Y.*—On Pelvic Cellulitis and Pelvic Peritonitis, Clinical Lectures on the Diseases of Women (edited by A. R. Simpson): Edinburgh, A. & C. Black, 1872. *Simpson, A. R.*—Quarterly Report of the Royal Maternity and Simpson Memorial Hospital: Ed. Med. Journal, Vol. XXVI., p. 1059. *Spiegelberg*—Remarks upon Exudations in the Neighbourhood of the Female Genital Organs: Second Series of German Clinical Lectures, Translated by New Sydenham Society, 1877. *Tait, Lawson*—On the Treatment of Pelvic Suppuration by Abdominal Section and Drainage: Tr. of Lond. Roy. Med. and Chi. Soc., 1880, p. 307. *Williams, John*—Serous Perimetritis: Lond. Obstet. Trans., 1885. *Winckel*—Die Pathologie der weiblichen Sexual-organe: Leipzig, 1881. This last gives photo-lithographs of great value. *Ziegler*—A Text-book of Pathological Anatomy and Pathogenesis, Macalister's translation: London, Macmillan and Co., 1883. See also Index of Recent Gynecological Literature in the Appendix.

Pelvic Peritonitis. IN treating of the subjects of pelvic peritonitis and pelvic cellulitis it will be convenient to take up some preliminary matter and then to consider separately each condition under the following heads:—

Nature,
Pathological anatomy and varieties,
Etiology,
Symptoms,
Physical signs,
Diagnosis and differential diagnosis,
Course and results,
Prognosis,
Treatment.

Further, their effect on the position of the uterus will require special consideration.

Preliminaries.

Preliminary considerations.—The subjects of pelvic peritonitis and pelvic cellulitis are by no means thoroughly worked out. The literature is extensive, but not so valuable as medical literature often is. This arises from various causes, among which the most important is the change in the theories as to the anatomical site of pelvic inflammatory conditions. Nonat and Simpson contended that pelvic peritonitis and pelvic cellulitis were distinct affections, and considered the latter as being of frequent occurrence. Then Bernutz and Goupil turned the tide for some time by their able work, where they classed almost all pelvic inflammatory affections as peritonitic. They, however, greatly underrated the amount of connective tissue surrounding the cervix, as Guérin has more recently done with regard to the connective tissue of the broad ligaments; Le Bec has endeavoured to support the opinions of the latter by his observations on the lymphatic distribution of the broad ligaments.

There is now little doubt that Bernutz and Goupil pushed their views too far; and in America, Germany, and Britain, gynecologists now consider pelvic inflammation as both peritonitic and cellulitic. Clinical, anatomical, and pathological facts are each day putting this view on a firmer basis. The fact, however, that these diseases are not rapidly fatal, and that generally we get post-mortems only of advanced or resolved cases, along with the admitted difficulty of exact clinical differentiation, renders our knowledge much less complete and exact than could be wished.

Finally, we must note that both diseases are almost always combined. Thus in a marked pelvic peritonitis there is always some pelvic cellulitis, and in a marked pelvic cellulitis always some pelvic peritonitis. This is quite analogous to what is found in pleurisy and pneumonia.

PELVIC PERITONITIS.

Synonyms.—Perimetritis: Pelveo-peritonitis.

Nature.—An acute or chronic inflammatory condition affecting chiefly the pelvic peritoneum.

PATHOLOGICAL ANATOMY AND VARIETIES.

Pathological Anatomy.

In the early stages, the peritoneum is injected and the epithelial cells dull in lustre. Soon, in marked cases, fibrinous or serous fluid is poured out: the former stiffens the peritoneum and often causes extensive adhesions between uterus and rectum, Fallopian tubes and ovary; the latter either remains free in the cavity, or becomes encysted by the false membranes already alluded to, often making Douglas' pouch to bulge down. In bad cases, pus is formed. We may therefore speak of simple pelvic peritonitis, adhesive pelvic peritonitis, and serous or purulent pelvic peritonitis. These, however, are mere varieties. Tubercular and malignant peritonitis will be considered by themselves.

Varieties.

ETIOLOGY.

Etiology.

The causes of pelvic peritonitis are numerous. They are chiefly the following.

1. The existence of pelvic cellulitis, pelvic hæmatocele, ovaritis, ovarian tumour, fibroid tumour, tubercle, or carcinoma.
2. Childbirth and abortion.
3. Gonorrhœa.
4. Latent gonorrhœa in the male.
5. A chill, especially during menstruation.
6. Venereal excess.
7. Instrumental examination by the sound; stem pessaries, sponge or tangle tents.
8. Tubal disease.

1. *The existence of pelvic cellulitis, pelvic hæmatocele, ovaritis, ovarian tumour, fibroid tumour, tubercle, or carcinoma.*

We have already noted that marked pelvic cellulitis is always associated with some pelvic peritonitis. The pelvic peritoneum and cellular tissue are adjacent and intimately connected with one another in their vascular, nervous, and especially in their lymphatic supply; we have already seen how the stomata of the peritoneum communicate with subendothelial lymphatics. In the same way we can understand a pelvic peritonitis arising secondarily from ovaritis. A hæmatocele is always followed by inflammatory changes in the peritoneum.

Ovarian tumours often set up pelvic peritonitis after being tapped as well as from their mere mechanical pressure or from torsion of their pedicle—a fact of the highest importance as regards the operation of ovariotomy. Occasionally we get general peritonitis from suppuration of a small ovarian tumour and its perforation with escape of pus into the peritoneal cavity. Small fibroids, tubercle, and cancer do the same, and thus give rise to considerable difficulty in diagnosis. Foulis of Edinburgh has thrown much light on malignant peritonitis, by showing that in the ascitic fluid we find very characteristic cell clusters. This will again be referred to under ovarian tumour.

2. *Childbirth and abortion.* When an inflammatory lesion follows these, it is generally cellulitic and, as we shall afterwards see, probably septic. Pelvic peritonitis often enough follows, and is then probably likewise septic. According to Lusk, who quotes Steurer's unpublished researches, "bacteria pass along the lymphatics . . . and perforating those beneath the peritoneum set up pyæmic peritonitis." At the same time, the peritonitis may result from simple bruising.

3. *Gonorrhœa* is one great cause of peritonitis. It may result from actual spread of the gonorrhœal virus; or be sympathetic, like orchitis in the male. In the former case the purulent infection probably passes along the Fallopian tubes and out at the fimbriated end, setting up a severe peritonitis. In puerperal women, gonorrhœa is by no means innocent, as the following case by A. R. Simpson shows:—

"J. C., primipara, prostitute, æt. 18, was admitted to the hospital and delivered of a male child. On the afternoon following, severe peritonitis set in which proved fatal in ten days. On *post-mortem* the abdomen contained ℥ viii. of yellow pus. Surface of intestines covered with recent fibrinous lymph becoming purulent. Mucous membrane of bladder much congested and in certain areas rough and granular. . . . On squeezing the Fallopian tubes a large quantity of pus was expelled, and the tubes appeared to be much distended with it. Mucous membrane much congested." (Report by D. J. Hamilton.)

4. *Latent gonorrhœa in the male.*—By this term Noeggerath of New York, who first directed attention to the subject, means a gonorrhœa in the male apparently cured, which some time after—even two years—infects a healthy genital tract, causing discharge and pelvic peritonitic disturbance. The authors have seen some cases bearing out Noeggerath's views.

5. *Chill, especially during menstruation.*—It can be readily understood how the pelvic congestion of menstruation may under undue exposure to cold pass into peritonitis.

6. *Venereal excess* in prostitutes and newly married women may, for evident reasons, have peritonitis as its sequel, although exact proof of this is difficult.

7. *Instrumental manipulation.*—This is alluded to under the various instruments and needs mere mention here.

8. *Tubal disease.*—This is now recognised as an important cause of pelvic peritonitis, and has been above alluded to under *Gonorrhœa.* The facts that the genital tract communicates with the peritoneal cavity through the Fallopian tubes, and that gonorrhœa and septic diseases are due to micro-organisms, explain, in many instances,

the causation of peritonitis. Tubal disease and peritonitis are mutually related, inasmuch as occlusion of the tube may be set up after the peritonitis and thus tubal distention follow. Gonorrhœal pus sets up limited peritonitis, the explanation given being that the gonococcus, its specific organism, does not flourish on squamous as it does on cylindrical epithelium. The micrococci found in septic pus on the other hand set up violent peritonitis when introduced into the peritoneal cavity.

Bernutz's Analysis.

We append Bernutz's analysis of the causes of pelvic peritonitis in ninety-nine cases.

43 occurred in puerperæ.
28 ,, after gonorrhœa.
20 ,, during menstruation.
8 traumatic
  3 due to venereal excess.
  2 ,, syphilitic diseases of cervix.
  2 ,, introduction of the uterine sound.
  1 ,, use of vaginal douche.

SYMPTOMS AND PHYSICAL SIGNS.

A. Acute Peritonitis.

Symptoms.

Symptoms. Increased, full, and bounding pulse; increased temperature; rigor; shooting pains very severe.

Physical Signs.

Physical Signs. On palpation of lower part of abdomen the patient complains of pain; and the abdominal muscles, apart from the patient's volition, resist pressure. She lies usually on the back, and with both legs drawn up.

On vaginal examination the vagina feels hot and tender, and pulsating vessels may be felt in the fornices.

After exudation is present, we may feel one or other of the following conditions.

1. A flat hard non-bulging condition of the fornices round the cervix, which is not displaced to one or other side but is immobile. The usual simile, and a very good one, is that it feels as if plaster of Paris had been poured into the pelvis.

2. An indistinct fulness high up in the pelvis. This is from free serous exudation.

3. A bulging tumour behind the uterus displacing it to the front; or a tense fluid laterally, apparently in the site of the broad ligament (fig. 43).

The former is due to encysted serous effusion in the pouch of Douglas, the latter to encysted serous fluid behind the broad ligaments displacing it forwards. As a general rule these effusions are high in the pelvis and symmetrical. Sometimes the bulging retro-uterine tumour feels nodulated after a time; this is from extension of the inflammatory condition into the subjacent connective tissue.

Note that the Bimanual is often impossible owing to the rigid condition of the fornices and abdominal muscles. The bimanual estimation of effusion is often misleading owing to the fact that we feel the rigid peritoneal membrane through the fornices, and from the rigidity of the abdominal wall draw the conclusion that there is effusion between. Careful examination under chloroform is of the highest value in such cases.

B. Chronic Peritonitis.

Symptoms.

Symptoms. These are chiefly backache, sideache, leucorrhœa, increased menstruation and sterility. Pain is the most marked symptom, and is felt most on vaginal examination or coitus.

Physical Signs.

Physical Signs. On vaginal examination, obscure thickening is felt in the fornices. The uterus, if displaced, is often markedly anteverted from cicatrisation of the peritoneum in the pouch of Douglas. Very frequently it is retroverted and bound down by adhesions, which may, however, allow of a certain range of mobility.

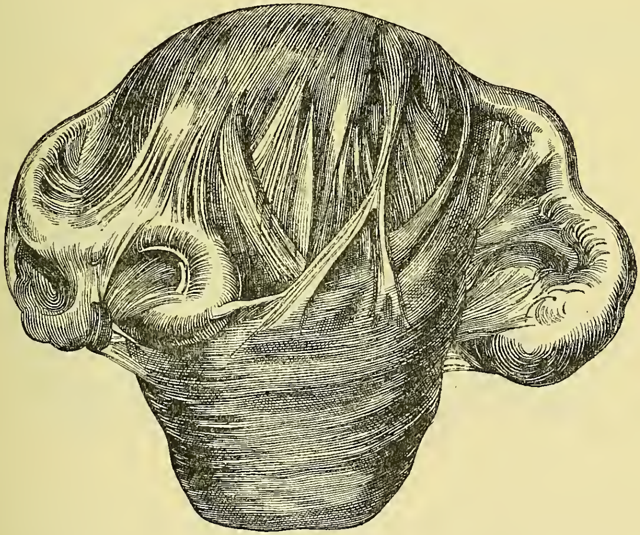

Fig. 113.

Peritoneal Bands binding down the Uterus, Tubes, and Ovaries—result of chronic pelvic peritonitis (*Heitzmann*).

The chronic form may occur as a sequel to the acute; most frequently it develops slowly of itself.

DIFFERENTIAL DIAGNOSIS.

This will be considered under Cellulitis.

COURSE AND RESULTS.

Course and Results.

Very often the inflammatory condition clears up. The adhesive form leaves its mark in the shape of pathological anteversions, and retroversions bound down (*v.* figs. 113, 114). The Fallopian tubes may have their ovum-conducting power so interfered with that an incurable sterility results. When they are not injured to this extent, conception may occur; and the adhesions may ultimately yield to the stretching brought to bear on them by the developing uterus. They may, however, resist this and cause abortion.

Occasionally, pelvic peritonitis becomes general and is then rapidly fatal. Serous exudations may become absorbed ; pus may be absorbed, but oftener perforates into the bladder, bowel, or vagina.

PROGNOSIS.

Prognosis. Each case must be judged on its own merits. We give, therefore, only general hints.

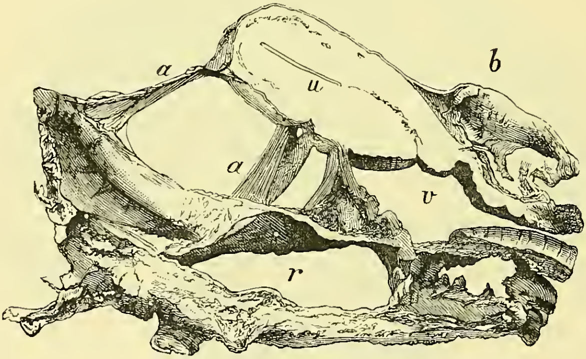

FIG. 114.

UTERUS retroverted and bound back by peritonitic adhesions (*Winckel*). *a a* adhesions ; *b* bladder ; *v* vagina ; *u* uterus ; *r* rectum. ($\frac{1}{2}$)

As to life.—Pelvic peritonitis is not usually fatal. If it becomes general and is septic or gonorrhœal in its origin, then the prognosis is very grave. A high and rapid pulse of long continuance, with a temperature not in the same ratio, also makes prognosis grave.

As to sterility.—This is difficult to give, and often time alone settles the point. The mechanical closure by pressure of the Fallopian tube—a condition not diagnosable—and ovaritis rendering ovulation impossible, are conditions often produced and both incurable. Prognosis as to conception should always be cautious, and never absolute when the peritonitis has been extensive.

TREATMENT.

Treatment.

A. Acute pelvic peritonitis.—*a. Prophylactic.*
b. General. (1.) Diet. (2.) Septicity. (3.) Pain. (4.) Pulse and Temperature.
c. Local.

Prophylactic Treatment.

a. Prophylactic.—This is of the very highest importance. The practitioner should always attend most scrupulously to antiseptic cleanliness in all vaginal, cervical, and uterine operations. Cautions on these points have been already given in Chap. XVI. and will be referred to again under the respective operations.

During the menstrual period young patients should avoid all undue fatigue, late hours, violent exercise, alternate exposure to heat and cold when insufficiently clad.

Gonorrhœa should be thoroughly treated, especially during pregnancy.

General Treatment.

b. General.—Under this we attend to diet; and employ remedies intended to combat the septic condition when present, to alleviate pain, and to bring down pulse and temperature.

Diet.

(1.) *Diet.*—In the early stages of inflammation, this should be chiefly milk, iced or mixed with lime water or potash water or lemonade. Among the better classes, apollinaris or seltzer water can be used. Seltzer water helps to combat the constipating tendency of milk diet.

Stimulants.

When the patient's strength is reduced and the pulse flagging, nutritious stimulating food must be frequently given. Milk should be still continued; but beef tea or strong soups every two or three hours must be added. Stimulants are requisite at this stage, viz., brandy, champagne, gin, or whisky. Care must be taken to give these in their stimulating doses, *e.g.*, for brandy, a table-spoonful every two or three hours.

Regulation of the Bowels.

The regulation of the bowels is not requisite in the early stages; but in the later periods must be looked after. Gentle aperients such as compound liquorice powder, colocynth and hyoscyamus pills, castor oil, etc., can be used; and occasional enemata are of service. Enemata should not, however, be used exclusively, as that might lead to the formation of troublesome scybala.

Tonics.

When suppuration is tedious, it should be seen that no bed sores form; and iron and quinine should be administered.

℞. Ferri et Quininæ Citratis gr. lxxx.
Aquæ ℥ij.
Sig. Teaspoonful thrice daily in water.

or

℞. Ferri et Ammonii Citratis gr. lxxx.
Aquæ ℥ij.
Sig. Teaspoonful thrice daily in water.

The bitterness is best masked by dilution with water and not with orange or other syrups which derange the stomach.

Treatment against Sepsis.

(2.) *To combat any septic condition.*—We know no specific medicine for this purpose. A favourite one is the muriate of iron of the Ed. Phar.

℞.	Tincturæ Ferri Muriatis (Ed. Phar.)	℥ij.

Sig. Thirty drops thrice daily in a glass of water. Water should be drunk freely after the dose is given, and the mouth thoroughly rinsed with bicarbonate of soda and water.

Quinine may be used for the same purpose.

℞.	Quininæ Sulphatis	gr. xxxvi.
	Acidi Sulphurici diluti	ʒij.
	Aquam ad	℥vj.

Sig. Tablespoonful thrice daily in water.

Treatment of Pain.

(3.) *To alleviate pain.*—Nothing is so good for this as the hypodermic injection of morphia.

℞.	Morphinæ Bimeconatis	gr. viij.
	Spiritus Vini Rectificati	miiij.
	Aquæ	℥j.

Sig. For Hypodermic injection. Fifteen minims contain $\frac{1}{4}$ grain of Morphia.

The bimeconate is a good preparation and causes less sickness than other forms; as one drachm of this preparation contains one grain of morphia, and as the hypodermic syringe holds only 30 min., it is impossible to give an overdose to an adult.

When doses larger than half-a-grain are needed, the hypodermic solution of the acetate of morphia (B. P.) may be employed. Twelve minims contain 1 grain, and therefore 3 minims is the first dose for an adult.

It is a good plan for the practitioner to keep the ordinary 8 gr. to ℥i. solution, and to prescribe the stronger solution only for any patient requiring it; in this way he avoids carrying two solutions of different strength by which mistakes might arise.[1] The *stronger* solution is prescribed as follows:—

℞.	Injectionis Morphinæ Hypodermicæ (B. P.)	ʒij.

Sig. For Hypodermic injection. Ten minims contain 1 grain Acetate of Morphia. Dose, 1 to 5 minims.

Chlorodyne (25 min.); Battley's solution (liquor opii sedativus, 15 min.) or laudanum (tinctura opii, 25 min.) may be used. More useful than these are morphia suppositories.

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[1] Morphia is also made up in compressed Hypodermic Tabloids, containing various doses. They are readily dissolved in a few drops of water, and are both reliable and portable.

℞. Morphinæ Hydrochloratis gr. $\frac{1}{3}$
Fiat Suppositorium Mitte tales vj.
Sig. As directed.

It is a good plan to quiet the pain rapidly with the hypodermic injection; and to keep up the good effect by suppository, in $\frac{1}{3}$ grain doses every six hours, beginning 6 to 8 hours afterwards. See that the patient or attendant understands that the suppositories are to be passed into the empty bowel.

Treatment of High Pulse and Temperature.

(4.) *To bring down pulse and temperature*—In early stages, tincture of aconite is invaluable.

℞. Tincturæ Aconiti ʒij.
Sig. Six drops are to be put in a wine glass containing six teaspoonfuls of water. Give a teaspoonful every quarter of an hour.

Drop doses of aconite are of great value. They should be given every quarter of a hour until the pulse is reduced and sweating brought on.

If the temperature still keep high, quinine in 15 grain doses may be given. The salicylate of quinine is a good preparation and is given just as quinine is. When the stomach is irritable the quinine, in 20 grain doses, suspended in an ounce of mucilage, may be given per rectum.

Antipyrin (10–15 grains) and antifebrin (5–10 grains) are useful. The former also aids in headache, but the latter tends to produce cyanosis and though very effective requires to be watched for undue depression. Alcohol may be given with it (*v.* Leech, Med. Chron., Vol. VIII. p. 297).

After the fever has subsided and suppuration threatens, the strength must be kept up by tonics (such as quinine and iron) and by nutritious food with a judicious amount of stimulant, claret for example.

Local Treatment.

c. Local Treatment. In the early stages of sthenic nonseptic cases, 8–10 leeches may be applied over the iliac regions.

Ice is not generally used as a local application in this country, and has its disadvantages.

Of greater use are large hot linseed poultices. They should be made very hot, a layer of flannel intervening between them and the skin, and should be covered with a layer or two of cotton. Such a poultice will be effective for 2 or 3 hours. Blisters and turpentine stupes are good, but soon render the skin so sore that after-treatment by poultices is difficult.

The hot vaginal douche (as directed at page 138), with carbolic acid added in septic cases, should on no account be omitted.

Encysted serous collections should, as a general rule, be left to be absorbed. When troublesome from pressure, they may be tapped by Matthieu's aspirator. A clear serous fluid, often coagulable, is then drawn off, so like urine that the almost involuntary first thought is that the operator has tapped the bladder by mistake.

Pus does not form very often in pelvic peritonitis. It may perforate into the rectum or through the posterior fornix. The treatment of suppuration will be best considered under pelvic cellulitis, but we may state here that abdominal section and drainage may be required in suppurative peritonitis and in cases due to suppuration of an ovarian cyst with perforation.

Treatment when Chronic.

B. Treatment of chronic pelvic peritonitis.—When adhesions are extensive, the case is better left alone. When the uterus is retroverted, it may ultimately be replaced by bimanual manipulation. Massage is good in such cases, but its employment will be considered afterwards when we speak of the systematic treatment by rest and food (*v.* Appendix).

Of late, since our knowledge of the nature of tubercle has been rendered more exact by Koch's discovery of the tubercle bacillus, *tubercular* peritonitis has been found to be by no means rare; and the bacillus tuberculosis has now been discovered, sparingly and in giant cells, by several observers. We may also have *malignant* peritonitis, due usually to rupture of papillomatous ovarian cysts. In both the tubercular and the malignant form we get ascitic fluid, but characteristic cells in the latter only.

TUBERCULAR PERITONITIS.

LITERATURE. *Hegar*—Die Entstehung, Diagnose und chirurgische Behandlung der Genitaltuberculose des Weibes: Stuttgart, Enke, 1886. *Poten*—Ein Fall geheilter Bauchfelltuberculose: Cent. für Gyn., 1887, S. 33. *Schwarz*—Ueber die palliative Incision bei Peritonitis tuberculosa: Wien. Med. Wochens., No. 13, 1887. *Tait, Lawson*—Diseases of the Ovaries, fourth edit., p. 334: Birmingham, 1883. *Wells, Sir T. S.*—Ovarian and Uterine Tumours, p. 100: Churchill, London, 1882. For history and further literature see Schwarz, or Cassel's Year Book for 1888. See also Index of Recent Gynecological Literature in the Appendix.

Preliminary Remarks.—The serious results of tubercular disease of the lungs, meninges, and mucous tracts, render the comparatively good prognosis in tubercular peritonitis as remarkable as it is at present inexplicable. In Wells' historical case in 1862, abdominal section was performed for ascites due to peritoneal tuberculosis, miliary tubercles were found studding the bowel surface; and yet, as the result of the section and evacuation of fluid only, complete recovery took place, the patient being well nineteen years afterwards (1881). Since then, equally good results have been obtained by others.

Symptoms.—The patient's general health may be good, with no rise of temperature if the peritoneum alone is affected. It must be kept in mind, however, that the lungs may be simultaneously implicated.

Physical Signs.—We may have fluid in the abdomen so encysted as to simulate ovarian cyst, or there may be free fluid with irregular lumps due to matting of bowels and omentum.

The *Differential Diagnosis*, which is chiefly from ovarian cyst and malignant peritonitis, is difficult and may be cleared up only by exploratory incision.

Treatment.—Abdominal Section, with complete evacuation of fluid and careful peritoneal toilette so as to dry out as thoroughly as possible, is all that is requisite; the use of antiseptic irrigations or the applications of iodoform to the peritoneum before the wound is closed has been found unnecessary, and the same may be said of drainage. In 17 cases collected by Schwarz, the general age was seventeen to thirty-three: youngest, four; oldest, fifty-seven. Immunity was found in these to range from two to ten years, but one case of complete cure has been recorded by Wells. A phthisical condition of lung if not too far advanced is not a contra-indication.

MALIGNANT PERITONITIS.

By this we mean a condition where the peritoneum is more or less invaded by papillomatous growths secondary usually to rupture of papillomatous cysts of the ovary (*v.* Pathology of Ovarian Tumours, Chap. XXII.).

Symptoms.—The patient is not at first cachectic, and the only thing attracting attention is the distension of the abdomen from fluid. The condition is not necessarily fatal, and we have seen one case where the patient lived for three or four years. It may, however, soon cause death when pleuritic or pericardial effusions come on.

The *Physical Signs* are abdominal distension, irregularly encysted fluid, irregular masses felt in the abdominal cavity on palpation, with occasionally secondary nodules in the pelvic or iliac glands, and characteristic cell-groups in the fluid drawn off. These render diagnosis fairly easy.

The *Treatment* is palliative by tapping.

PELVIC CELLULITIS (PARAMETRITIS).

SYNONYM.—Parametritis, a term sometimes limited to inflammation of the cellular tissue round the cervix and upper part of vagina—Virchow's parametric tissue. At the close of this chapter, we shall have to notice specially a variety of this described by W. A. Freund as *Parametritis chronica atrophicans circumscripta et diffusa.* Pelvic Cellulitis.

NATURE.—An acute or chronic inflammatory affection, usually septic, affecting the cellular tissue of the pelvis.

PATHOLOGICAL ANATOMY AND VARIETIES.

Pathological Anatomy and Varieties.

It is the rare exception to examine a multiparous female pelvis without finding some trace of a previous cellulitis or peritonitis. Thus split cervix, so common in women who have borne children, is almost always associated with some cellulitis at the base of the broad ligaments. The uterus is rarely central, but is often drawn to the one side by the cicatrisation of some previous lateral cellulitic inflammation of the broad ligament; the traction may even be so great that it lies at right angles to its proper axis. We have seen that the utero-sacral ligaments are peritoneal folds containing connective tissue and unstriped muscular fibre. Inflammatory attacks in one or both of these folds (combined pelvic peritonitis and pelvic cellulitis) are very common. Schultze calls this "parametritis posterior," but utero-sacral cellulitis is a more accurate term. The cicatrisation of these ligaments after such inflammation, causing traction just above the isthmus, brings about the most common cause of dysmenorrhœa and sterility—pathological anteflexion of the uterus (*v.* Anteflexion of the Uterus). It is evident that in this way, too, we get the uterus anteflexed and drawn to one side, or anteflexed and drawn back (fig. 38).

Sometimes pelvic abscesses are found in localities to be afterwards alluded to. Often the uterus and ovaries are in an atrophic condition owing to compression of the vessels and nerves by the cellulitic attack; this quite agrees with the clinical fact that many women with bad pathological anteflexion do not suffer much at their periods, because the withered condition of the organs produces scanty menstruation. According to some, we can have no cellulitis in the broad ligaments and no formation of pus—abscess of the broad ligaments. Clinical, anatomical, and pathological evidence is in favour of the occurrence of both. At the same time, it is almost impossible clinically to distinguish abscess of the broad ligament from an encysted serous pelvic peritonitis behind it, pushing it forwards.

ETIOLOGY.

Etiology.

In *parous women* the great cause of pelvic cellulitis is probably septic matter (*i.e.* either micrococci or bacilli, or their products) absorbed by the lymphatics from the torn perineum, vagina, or cervix. This passes along the abundant lymphatics and blood-vessels in the cellular tissue beneath and in the broad ligaments, causing inflammation of the glands and proliferation of the connective tissue in which these are embedded. Thus we find *childbirth*, *premature labour*, and *abortion*, often followed by cellulitic attacks for obvious reasons. In parturition we have the cervix, for instance, torn vertically at one side; and septic matter deposited there often speedily spreads along the lymphatic stream (*v.* Chap. XVI.).

In *nulliparæ*, cellulitis may arise from the same causes as are given under pelvic peritonitis, *e.g.*, exposure to cold during menstruation.

Pelvic peritonitis, in a minor degree, is always associated with cellulitis as already mentioned. So far as we have considered the etiology of pelvic inflammatory affections, we have associated them with some virus, most frequently septic. We do not believe that mere traumatic injury, apart from septicity and tension, can cause an inflammatory attack.

SYMPTOMS.

Symptoms.

The patient has a rigor or chill. Pain is felt over the lower part of the abdomen, but it is not so intense as in peritonitis. The pulse and temperature are raised. After exudation has taken place, the patient may have one thigh alone drawn up.

PHYSICAL SIGNS.

Physical Signs.

There is pain on palpation of the abdomen; and after exudation has taken place, we feel a fulness at one side of the uterus or in the iliac fossa.

Bimanual examination, always difficult, reveals at first nothing but increased heat and tenderness. After exudation has occurred, it is found in the following positions:—

(1.) As a bulging at the side of the uterus, depressing the lateral fornix and pushing the uterus usually to the other side;

(2.) in the upper portion of the broad ligament, and therefore not bulging downwards;

(3.) in the iliac fossa;

(4.) very rarely, behind the uterus;

(5.) almost never, between uterus and bladder.

We have seen pus pointing in the inguinal region on one side, and with no dipping down into the pelvis or immediate connection with the side of the uterus. When pus is present in large amount, the fluctuation can be felt bimanually. When it forms in the centre of a large inflammatory exudation, an obscure boggy feeling may or may not be made out. Aspiration helps here very much.

Explanation of course of Exudations.

The course of these exudations, inflammatory and purulent, is explained in two ways.

(*a.*) By the course of the lymphatics, which run, as we have seen, from the uterus outwards beneath and between the layers of the broad ligament to the glands in the lumbar region.

(*b.*) By the lines of cleavage in the cellular tissue of the pelvis. The student should refer back to the description of cellular tissue of the pelvis given in Chap. II., and especially to König's researches (page 42). Based on these, and on clinical work, König holds that—

(1.) An exudation in the broad ligament, near the tube and ovary, passes first along the psoas and iliacus and then sinks into the true pelvis;

(2.) exudations which begin primarily in the deeper cellular tissue on the antero-lateral aspect of the cervix, pass first on to the cellular tissue of the true pelvis at the side of the uterus and bladder, then with the round ligament to Poupart's ligament beneath the inguinal canal, and then they pass outwards and backwards into the iliac fossa;

(3.) abscesses, developing from the posterior aspect of the broad ligaments, fill first the postero-lateral part of the pelvis and then pass as in (1.).

DIFFERENCES AND DIFFERENTIAL DIAGNOSIS BETWEEN ACUTE PELVIC PERITONITIS AND CELLULITIS.

Differences and Differential Diagnosis.

Differences.

Pelvic Peritonitis.	*Pelvic Cellulitis.*
(1.) Inflammatory affection of pelvic peritoneum chiefly.	(1.) Inflammatory affection of pelvic cellular tissue chiefly.
(2.) Usually general, round the uterus.	(2.) Usually lateral.

Differential Diagnosis.

Pelvic Peritonitis.	*Pelvic Cellulitis.*
(1.) Pain very severe.	(1.) Pain not so severe.
(2.) Patient's legs drawn up on both sides.	(2.) Usually only one leg drawn up.
(3.) Firm flat effusion not bulging into fornices, and situated round the uterus; or a mesial bulging of serous effusion behind uterus. Cervix (vaginal portion) is of normal length.	(3.) Firm effusion, bulging usually into fornix of one side. Thus cervix (vaginal portion) apparently shortened on one side.
(4.) Does not spread along round ligament or into iliac fossa, but may affect all peritoneum.	(4.) Exudation or pus spreads in definite directions, and is usually localised.
(5.) Uterus displaced to front, or unaltered in position.	(5.) Uterus usually displaced to one side.
(6.) Vomiting more frequent.	(6.) Vomiting less frequent.

It is often very difficult to differentiate these; and therefore in some cases the diagnosis must be pelvic inflammation—probably cellulitic or probably peritonitic, as the case may be.

COURSE AND RESULTS.

Course and Results.

Very often the attack passes off and leaves no trace. The septic poison is too small in amount to do harm; or it sets up some inflammatory exudation, which mechanically arrests progress, and then becomes absorbed. The vitality or health of the tissues and the strength of the poison have also their share in determining its progress. Exudation may take place and may be absorbed almost completely, may suppurate slowly, and only to a limited extent, and may form a large abscess. This abscess may open into the bowel or bladder, or pass below Poupart's ligament, or upwards beneath the kidney. Rarely does it appear in the perineum, or pass through the sciatic notch to the buttock. In one case where the last occurred, the patient complained of a very deep-seated pain just over the notch.

It is valuable to note how rarely the abscess perforates into the peritoneal cavity. The peritoneal surfaces of the abdominal contents are in contact; and as the inflammatory attack spreads, it sets up a peritonitis which glues the adjacent surfaces together. When pus does enter the peritoneal cavity, it sets up a rapidly fatal peritonitis.

Matthews Duncan has recently pointed out that albuminuria is often present in pelvic cellulitis but not in pelvic peritonitis; it was present in 6 out of 16 cases (37·5 p. c.) of cellulitis but absent in 32 cases of peritonitis.

PROGNOSIS.

Prognosis.

This depends on the extent of the inflammatory attack, and its effect on the patient's health. Its septic origin usually causes anxiety; but it does not spread so rapidly as peritonitis. Resolution of inflammatory deposits is slow. Pathological anteflexion gives rise to troublesome dysmenorrhœa and sterility. Prognosis should always be guarded as to complete recovery.

TREATMENT.

Treatment.

The general and the local treatment are exactly the same as in pelvic peritonitis. The occurring of suppuration is indicated by rigors, and should be hastened by the hot douche and poultices. We may have only part or parts of the exudation suppurating, so that in a cellulitic swelling we may have inflammatory exudation containing separate abscess cavities. In these, tapping with Matthieu's aspirator is very good, and may be often repeated. Care should be taken that the aspiratory needle has been purified in carbolic lotion (1-20), and prior to introduction dipped in carbolic oil (1-20).

Treatment of Pelvic Abscess.

When pus is present in large quantity, the treatment varies according to the part at which it points.

(1.) If it point above or below Poupart's ligament, in the buttock, or behind the kidney, it is to be opened under Listerism, and a drainage tube inserted. Results by this method are admirable.

(2.) If it bulge in the vaginal roof, it should be opened as follows:—pass Sims' speculum, and open into the cavity with Paquelin's cautery at a dull heat; make the opening big enough to admit two good-sized drainage tubes. Daily irrigate the cavity with weak carbolic lotion (1-100) or boracic lotion (1-30). If the discharge is profuse it may be received into pads of sublimated wood-wool wadding placed over the vulva; oakum or marine lint may be used among the poor.

The drainage tubes should be double, and with a small piece at the end at right angles which prevents their slipping out. They should not be perforated, as this prevents the washing out. Straight tubes can be fastened with a stitch to the edge of the incision.

The practitioner will very often find the remains of cellulitis as an indistinct thickening in the fornices. For these, blisters in the iliac regions, the glycerine plug, and hot douche, are useful (*v.* under Chronic Ovaritis).

EFFECTS OF PELVIC PERITONITIS AND CELLULITIS ON THE UTERUS.

Effects of Peritonitis and Cellulitis on the Uterus.

It is unfortunate that uterine displacements have of late years bulked so largely in gynecology—we mean by this that many regard a uterine displacement in itself as a condition sufficient to account for symptoms of bearing down pain, leucorrhœa, or even for sterility and dysmenorrhœa. It is a well-ascertained fact that uterine displacements are in many cases

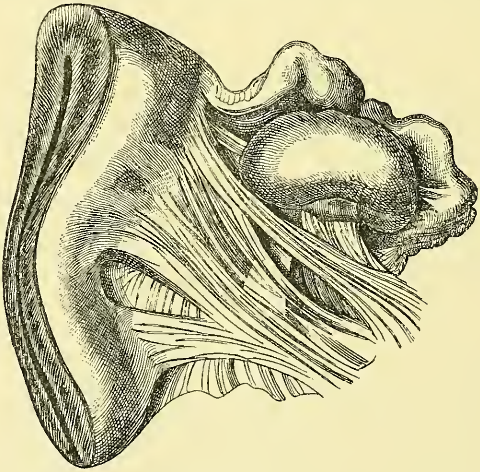

FIG. 115.

PERITONITIC ADHESIONS DRAWING THE UTERUS TO ONE SIDE (*Heitzmann*).

the result of antecedent peritonitis or cellulitis, are mere physical signs of these affections, and therefore secondary lesions of far less importance than the pelvic inflammation which was the primary one.

These displacements might be grouped under the two heads :—

A. those caused by Pelvic Peritonitis;
B. those caused by Pelvic Cellulitis.

A. *Displacements caused by Pelvic Peritonitis.*

Displacements from Peritonitis.

From the lymph effused and the resultant bands formed in pelvic peritonitis the uterus becomes bound to the adjacent peritoneum on the rectum (retroversion and retroposition); or more rarely, to that on the bladder (anteversion); sometimes it is twisted on its long axis or matted to the coil of intestine surrounding it. Figs. 113, 114, 115, illustrate these conditions.

The *Diagnosis* of such adhesions is made by digital pressure through the rectum in the case of retroversion, and through the anterior fornix in anteversion. In the former case, the immobility of the uterus is felt; and when pushed up so as to be manipulated by the abdominal hand, replacement is found to be impossible; or if partially successful, the displacement returns almost immediately. Sometimes the retroverted uterus when not enlarged is replaced with difficulty owing to the cohesion of the peritoneum on the posterior uterine surface with the peritoneum behind it, and this point has to be borne in mind. The sound should certainly not be employed in cases with adhesions; as, by its leverage, vascular adhesions may be torn and the hæmorrhage produce hæmatocele with subsequent pelvic peritonitis.

B. *Displacements caused by Pelvic Cellulitis.*

These are two in number: viz. (a.) Lateriversion; and (b.) Pathological Anteflexion due to Utero-sacral Cellulitis.

Lateriversion.

(a.) *Lateriversion* is the result of cellulitis in one broad ligament, subsequent absorption of the inflammatory effusion, and cicatrisation of the ligament. The *Diagnosis* of this condition is easy. There is often a split of the cervix at the side corresponding to the displacement as well as scarring in the fornix with coincident displacement of the cervix. Bimanually, the uterus is felt drawn to the one side, fixed, and sometimes the body is lateriflexed as it were on the cervix. Bimanual displacement of the uterus to the non-affected side causes pain. The pathology of this displacement in many cases is that cellulitis, probably septic, has spread after parturition from the split cervix along the lymphatics at the base of and in the broad ligament; effusion of lymph, perhaps of pus, has followed; finally there result the incomplete resolution and cicatrisation already mentioned.

Pathological Anteflexion.

(b.) *Pathological Anteflexion due to Utero-sacral Cellulitis* is one of the most important, most intractable, and most misunderstood of lesions. Its nature may be thus described. A cellulitis, in or in the neighbourhood of the utero-sacral ligaments, has gone on to cicatrisation,—producing fixation of the uterus and, along with the action of intra-abdominal pressure, anteflexion (*v.* Chap. XXXIII. Displacements of the Uterus). This cellulitis is often the result of abortion, more rarely of full-time parturition; it is frequently found in nulliparæ, and may in some cases be due to the zymotic diseases of childhood.

This condition is *diagnosed* as follows: on vaginal examination, the cervix is found high up, because drawn back, and pointing usually downwards and forwards; through the anterior fornix the body of the uterus is felt. Bimanually, the uterus is recognised as lying anteflexed as shown in fig. 38. Through the posterior fornix we feel thickening and fixation of the tissue in the neighbourhood of the utero-sacral ligaments, or we may sometimes feel the thickened ligaments themselves running in a direction forwards and inwards. The rectal examination gives valuable information, as the thickening is more distinctly felt, the anteflexion is more accurately mapped out and ovaritis or other inflammatory thickening discovered.

The amount of fixation should be estimated by bimanual movement of the uterus, as this helps in prognosis. Often the cellulitis affects one side of the parametric tissue and gives a displacement of the uterus towards the posterior extremity of an oblique diameter of the pelvis.

We shall have again to consider the symptoms and treatment of these conditions in the chapter on Displacements of the Uterus. From what has been said, however, it will be evident that their treatment should be simply that of chronic peritonitis and cellulitis.

PARAMETRITIS CHRONICA ATROPHICANS.

Parametritis Chronica Atrophicans.

We have already described some of the results of acute pelvic peritonitis and cellulitis in causing pathological retroversions and anteflexions. W. A. Freund of Strassburg has drawn attention to a condition of the pelvic connective tissue similar in some of its results but differing from what we have described in not having an acute stage. He terms it *Parametritis Chronica Atrophicans Circumscripta et Diffusa.* His researches are very valuable and explain results usually ascribed to mere displacements of the uterus or the pathological condition of the cervix; they also give a basis for treatment or at least show the futility of much of the mechanical treatment by pessaries.

a. Parametritis Chronica Atrophicans Circumscripta.

Nature.—A circumscribed chronic inflammatory process affecting chiefly the fascial and aponeurotic thickenings of the fatless connective tissue, and causing changes analogous to those in cirrhosis of the liver, kidney, and spleen.

Etiology.—The primary cause may lie in bladder, rectum, or uterus. When in the bladder, there has been some ulcerative process from which irritation has passed causing paracystitis chronica atrophicans (inflammation of the connective tissue near the bladder). From the side of the bladder, thickenings in the connective tissue pass outward and forward and by their ultimate atrophy bring about uterine displacement in the opposite direction: thus, left paracystitis will cause retro-dextro-flexion of the uterus, while right paracystitis will bring about retro-sinistro-flexion.

In the rectum, the starting-point may be dysenteric or simple follicular ulceration at the level usually of the anterior fold of mucous membrane forming part of the sphincter tertius. The cellulitic irritation runs in the utero-sacral ligaments and causes pathological anteflexion. This effect of rectal disease has not been sufficiently recognised in this country and is worthy of clinical and pathological investigation.

Freund records two interesting post-mortems of chlorotic women, 19 and 23 years of age respectively: the heart, large arteries, and kidneys were hypoplastic (*i.e.* insufficiently developed); the ovaries were small and cystic; chronic pelvic peritonitis was present in Douglas' pouch; and finally, there was follicular ulceration above the sphincter tertius, and chronic paraproctitis (chronic inflammation of the connective tissue near the rectum) with shortening of utero-sacral ligaments.

In the uterus, split cervix is one great cause; we have, radiating from the split, chronic thickening running along the base of the broad ligament behind the cervix and down to the fornix. By the atrophy and cicatrisation of these chronic inflammatory thickenings there result ultimately displacements of the uterus, compression of the veins, and therefore catarrh of the cervix with reflex pains due to alterations in the sympathetic filaments distributed in the connective tissue.

In *diagnosis*, careful examination (vaginal, rectal, and bimanual) reveals the thickening due to the chronic parametritis, and the consequent displacement; the initial lesion in bladder, rectum, or uterus, may be made out.

b. Parametritis Chronica Atrophicans Diffusa.

We have here a condition whose pathology is not so evident as that of the circumscribed form. It is said to begin in the base of the broad ligaments and to pass out to the pelvic walls. Ultimately, the whole pelvic tissue becomes dense, the veins partly narrowed and partly dilated, the arteries contracted and the ureters distorted. Hyperæmia of the urethra, the neck of the bladder, and rectum, is present, causing catarrh; while the uterus, at first enlarged and catarrhal, finally atrophies; the Fallopian tubes and ovaries also become atrophied; the vagina is shortened and the external genitals withered.

On microscopic examination, perineuritis of the sympathetic plexuses in the connective tissue has been found (H. W. Freund). The *etiology* is obscure. It may be due to sexual excess or frequent child-bearing and excessive suckling in women with hypoplasia of the genital organs and blood vessels.

Diagnosis is based on careful bimanual examination and determination of the changes above described, by attention to the history and carefully noting the conditions of menstruation (at first profuse and painful, and then scanty), as well as the catarrhal processes going on in the bladder, cervix uteri, and rectum.

Reflex disturbances in Parametritis Atrophicans.

Reflex disturbances arise from both varieties of Parametritis Atrophicans, due to the changes (from inflammation and pressure) in the sympathetic filaments. We may speak of these as Sympathetic, Spinal, and Cerebral Hysteria.

In the Sympathetic form, we have neuralgia of the stomach and intestines, aching kidneys, vesical pains, palpitation of the heart, and disturbances of the respiration.

In the Spinal group, there are painful spots over the spinous processes of the cervical, dorsal, and lumbar vertebræ; the pains may radiate laterally and we may get pains in the extremities. Hysterical paralysis may ultimately develop.

In the Cerebral group, there is neuralgia of the fifth nerve, hemicrania, and fixed boring pains.

The *Prognosis* is fairly good in the circumscribed form but not hopeful in the diffuse.

Treatment.—In the circumscribed form, the cause (in bladder, rectum, or cervix) must, when possible, be treated. The vaginal hot douche and bimanual massage to set up absorption and perhaps stretch nerve filaments (as in Nussbaum's nerve-stretching for sciatica) have done good. The influence of stitching cervical lacerations (Emmet's operation) may be beneficial.

The usefulness of treatment of the uterine displacements by pessaries is evident.

In the diffuse form and when nervous symptoms arise, we must rely on nervous remedies, chiefly bromide of potassium. For the neuralgia, the constant current and systematic massage may be tried; and, for the paralysis, the interrupted form.

CHAPTER XVIII.

PELVIC HÆMATOCELE AND HÆMATOMA: NEW GROWTHS IN THE PELVIC PERITONEUM AND CONNECTIVE TISSUE.

LITERATURE.

HÆMATOCELE AND HÆMATOMA.—*Aitken, Lauchlan*—Case of Pelvic Hæmatocele: Ed. Med. J., 1862, p. 104. *Bandl*—Die Krankheiten der Tuben, etc., Billroth's Handbuch: Stuttgart, 1879. *Barbour*—The Diagnosis of Advanced Extra-uterine Gestation after the Death of the Fœtus: Edin. Med. Jour., 1882. *Barnes*—Diseases of Women: London, 1878, p. 590. *Bernutz and Goupil*—Clinical Memoirs of the Diseases of Women, Vol. II.: New Syd. Soc., Meadows' Tr., 1866. *Bernutz*—Hématocèle utérine: Archiv. de Tocologie, 1884, p. 978. *Bourdon*—Tumeurs fluctuantes du petit bassin: Rev. Méd., 1841. *Credé*—Monatsschrift f. Geburtskunde, Bd. IX., S. 1. *Duncan, Matthews*—Uterine Hæmatocele: Ed. Med. J., 1862, p. 418: Diseases of Women, Churchill, Lond., 1883. *Düvelius*—Beitrag zur Lehre von der operativen Behandlung des Hæmatoma periuterinum extraperitoneale: Archiv für Gynäk., Bd. XXIII., S. 107. *Freund*—Die Gynäkologische Klinik: Strassburg, 1885. *Fritsch*—Die retrouterine Hæmatocele: Volkmann's Sammlung, No. 56. *Gusserow*—Ueber Hæmatocele periuterina: Arch. für Gynäk., Bd. XXIX., Hft. 3. *Hart and Carter*—The Frozen Sectional Anatomy of advanced Extra-uterine Gestation: Ed. Med. Jour., Oct. 1887. *Hunter, Wm.*—Intraperitoneal Blood Transfusion and the Fate of Absorbed Blood: Journal of Anat. and Phys., 1887. *Imlach*—Pelvic Hæmatocele treated by Abdominal Section: Brit. Med. Jour., 1885, I., 983; and 1886, I., 339. *Kuhn*—Ueber Blutergüsse in die breiten Mutterbänder und in das den Uterus umgebenden Gewebe: Zurich, 1874. *M'Clintock*—Diseases of Women: 1853. *Macdonald, Angus*—Uterine Hæmatocele, Ed. Med. J., Jan. 1883. *Martin*—Das extraperitoneale periuterine Hämatom: Stuttgart, Enke, 1881. *Nélaton*—Gaz. des Hôpitaux, 1851 and 1852. *Olshausen*—Ueber Hæmatocele und Hæmatometra: Arch. für Gynäk., Bd. I., S. 24. *Pelletan*—Clinique Chirurgicale: Paris, 1810. *Priestley, W. O.*—Pelvic Hæmatocele: Reynolds' System of Med., Vol. V., p. 783. *Schroeder*—Handbuch der Krankheiten, etc.: Leipzig, 1878, S. 453. Ueber die Bildung der Hæmatocele retrouterina und anteuterina: Arch. f. Gyn., Bd. V., S. 348. *Simpson, Sir J. Y.*—Periuterine or Pelvic Hæmatocele, Collected Works, Vol. III., p. 121: A. & C. Black, Edinburgh. *Tait, Lawson*—Lectures on Ectopic Pregnancy and Pelvic Hæmatocele: Birmingham, 1888. *Tilt*—Pathology and Treatment of Sanguineous Tumours, Lond. 1853. *Voisin*—De l'hématocèle Rétro-utérine: Thése, Paris, 1858. Traité de l'hématocèle: Paris, 1860. *Zweifel*—Zur Behandlung der Blutergüsse hinter der Gebärmutter: Archiv f. Gyn., Bd. XXII., S. 185. Zur Behandlung der Blutergüsse hinter der Gebärmutter: Arch. f. Gynäk., Bd. XXIII., S. 414. See also Index of Recent Gynecological Literature in the Appendix.

PELVIC HÆMATOCELE AND HÆMATOMA.

Preliminaries.

Preliminary Considerations.—The abundant venous supply of the pelvic organs, the congestion induced by menstruation, the hæmorrhage accompanying the monthly rupture of the Graafian follicle, and especially the rupture of an early extra-uterine gestation, render women peculiarly liable to hæmorrhages into the pelvic cavity. Yet it is astonishing that it is only since 1850 that this subject has really attracted gynecologists' attention. It was in that year that Nélaton gave the subject due prominence; although Recamier (1831), Bourdon, Velpeau, and Bernutz had all recorded cases—under such titles as "Bloodgush from an aneurism of the ovary," "Blood cysts of the pelvic cavity." Nélaton had diagnosed his case as an abscess, and opened it with a bistoury; the blood and blood clots escaping from the incision showed its real nature unmistakably. Since that time pelvic hæmatocele has taken its place in Gynecology as a serious and important *symptom.*

Terminology.—The hæmorrhage is either intra-peritoneal or extra-peritoneal, but both forms may be present. The terminology is at present unsettled. "Hæmatocele" *means* "hæmorrhage *into the peritoneal cavity*," but we may use the phrase "pelvic hæmatocele" as including both varieties, and add "intra-peritoneal" or "extra-peritoneal" where the diagnosis can be made. "Hæmatoma" is sometimes used instead of "extra-peritoneal hæmatocele." "Retro-uterine" hæmatocele is employed when the bulging is distinctly behind the uterus.

NATURE.—*An effusion of blood into the pelvic peritoneum or connective tissue.*

Pelvic hæmatocele is thus not a disease. It is only a symptom of some previously existing pathological condition of the pelvic organs, just as hæmoptysis is not a disease but usually a symptom of some lung condition.

PATHOLOGICAL ANATOMY.

Pathological Anatomy.

Our knowledge on this point is extremely defective, although of late some light has been thrown on it by information gained from abdominal section, and more especially by the recent admirable work of William Hunter. From experiments on the lower animals by intra-peritoneal transfusion of blood, he has arrived at the following conclusions:—

> "The results of the foregoing experiments may be regarded as definitely proving, that in the case of the peritoneal cavity at least the fate of extravasated blood is not so entirely a merely local one as has hitherto been generally supposed. On the contrary, a very considerable, sometimes even a large, proportion of the red corpuscles may escape a local fate altogether, becoming absorbed mainly through the lymphatics of the diaphragm into the circulation, where they continue, for a certain time at least, to perform their functions as before.
>
> "The rapidity with which this absorption takes place is always both relatively and absolutely greatest during the earlier hours after the effusion, especially in the case of entire blood, the absorption extending, however, over a period of twenty-four hours or even longer according to the amount of the effusion.
>
> "The maximum increase is attained to on the third or fourth day after the injec-

tion, the time depending partly on the quantity of blood transfused, partly on its fluidity. . . .

"The actual absorption of corpuscles which takes place during the earlier hours after the transfusion can, however, never be accurately determined, even by enumeration of the corpuscles in the circulating blood, still less by estimation of the hæmatoglobin. For owing to the serous effusion which almost always occurs into the abdomen as the immediate result of the injection, the number of corpuscles in the circulating blood as determined by enumeration, is always apparently much increased; and it is not till this effused serum, along with the injected serum, has become reabsorbed, and the injected serum has become removed from the circulating blood, that the actual amount of absorption of corpuscles which has taken place becomes apparent.

. . . .

"A slight inflammatory reaction always occurs for a few hours after the injection, resulting in an effusion of serum containing leucocytes, more or less marked according to the amount of irritation. This effusion is, however, of short duration, ceasing generally in the course of the first few hours, after which the effused serum along with that of the injected blood becomes reabsorbed back into the circulation.

"The irritation produced by the presence of clots is probably of more consequence, as it certainly is longer lasting. The resulting inflammation, however, is generally localised. In no instance at least in these experiments was it such as in any way to endanger life.

. . . .

"It is in the neighbourhood of the female generative organs, and in connection with pathological conditions of these organs, that such extravasations most frequently occur. A few considerations only need be presented here.

"If the extravasation take place extraperitoneally, *e.g.*, between the layers of the broad ligament, as is probably the case in the great majority of instances, it is clear that most of the conditions will be present, especially as regards the more or less definite boundaries of the extravasated blood, to ensure the early coagulation of the blood, and that, too, *en masse*. As any absorption of corpuscles which may then occur can only take place through the ordinary lymphatic channels of the pelvis, through which the absorption of corpuscles as such is but slight, by far the greater proportion of the corpuscles will thus be doomed to a local fate.

"If, on the other hand, the effusion of blood occur not only extraperitoneally, but also in part into the peritoneal cavity itself, as is probably not unfrequently the case, the ultimate fate of the blood may be different. Its coagulation may then be more or less delayed, and its absorption greatly facilitated by the special action of the diaphragm in promoting absorption.

"The distribution of the blood in such cases will naturally be, in the first instance at least, in the neighbourhood of the pelvic organs, although the peristaltic action of the intestines will tend to distribute it more or less amidst the coils of intestine. However clear may be the part played by the diaphragm in absorption in the case of animals, in whom the quantity of blood injected, relative to the size of the abdomen, is so great, the case is otherwise in the human subject, where the quantity of blood, relative to the size of the abdomen, may be very small, and the blood itself is generally situated at that part of the abdomen most distant from the diaphragm. It became of interest, therefore, to determine what part the diaphragm played in the absorption of small quantities of fluid.

"In two of my experiments on rabbits, in which death took place within a period of 24-36 hours after the injection, the inflammation was observed to be most intense over the under surface of the diaphragm and upper surface of the liver, these surfaces being covered with a thickish layer of fibrinous lymph, with, at parts, larger nodules of fibrin and leucocytes. It seemed as if the septic poison introduced had acted most virulently at the seat of its absorption. It has already been seen that it was in this neighbourhood that fluid blood was always found most abundant, if examination were made shortly after its injection."[1]

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[1] Loc. cit., pp. 461-465.

It is of the highest pathological importance to note that in a very large proportion of the cases diseased ovaries have been found; changes in the Fallopian tubes (dilatation and filling with blood or pus) being less common.

The effused blood undergoes changes in course of time; so that blood crystals, granular corpuscles, and oil drops are found as traces of the previous blood effusion. In most cases of recovery, it becomes entirely absorbed. As the result of abdominal section for ruptured Fallopian-tube gestation, it has been noted that the effused blood becomes increased in specific gravity and stains sponges deeply.

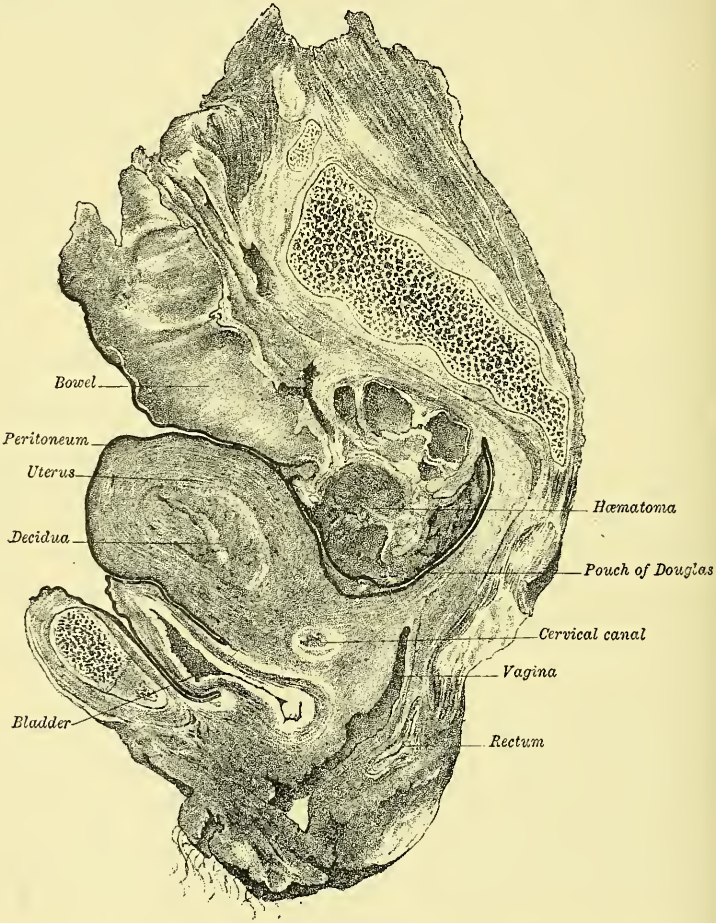

Fig. 116.

Hæmatoma felt as a Retro-uterine Tumour in case of Extra-uterine Gestation in Right Broad Ligament (*Hart and Carter*).

In the extra-peritoneal effusions, the fate of the extravasated blood is to a great extent local. The blood-clot is formed into connective tissue, and large areas of blood crystals are found.

Prognosis.

The practical deduction from all this is that in intra-peritoneal effusions the majority of cases can be tided over until the effused blood is absorbed. Ruptured Fallopian-tube gestations require abdominal section in most instances. In extra-peritoneal effusions the immediate prognosis is much less grave, and ultimate recovery usually takes place.

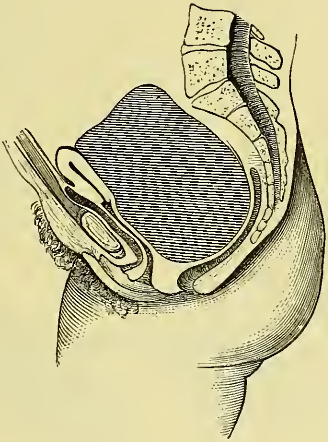

Fig. 117.

Retro-uterine Hæmatocele. Pouch of Douglas not previously obliterated (*Schroeder*).

ETIOLOGY: SOURCES OF HÆMORRHAGE AND VARIETIES.

Etiology.

The table quoted below shows that pelvic hæmatocele is most common in women between the ages of 25 and 35—that is, women in their period of full menstrual and sexual vigour. Out of 43 cases, the ages, according to Schroeder, were as follows:—

In	3	cases, or	7·0	p. c., the ages were . .	22-25
,,	**14**	,,	32·5	,, ,, . .	**25-30**
,,	**13**	,,	30·2	,, ,, . .	**30-35**
,,	9	,,	20·9	,, ,, . .	35-40
,,	3	,,	7·0	,, ,, . .	40-43
,,	1	,,	2·2	,, ,, . .	53

It is more common in parous women; there is considerable difference of opinion as to its frequency, Olshausen placing it as high as 4 p. c. of all female diseases, while Schroeder estimates it only at ·7 p. c.

The following are the chief causes of hæmorrhage and its anatomical sources.—

1. *Predisposing causes.* Profuse menstruation; violent exercise during menstruation, such as dancing; violent coitus during menstruation; varicose conditions of the subperitoneal veins; purpura; scorbutus; hæmophilia.

2. *Anatomical sources.* (*a.*) *Pelvic Peritoneum.*—There may be rupture of veins of the pampiniform plexus, or of the veins below the uterine peritoneum. In the former case, we may get the blood pouring directly into the peritoneal cavity; or first passing between the layers of the broad ligament, and either remaining enclosed there or rupturing into the peritoneal cavity. The hæmorrhage, according to Virchow, may arise from vessels developed in the false membranes of pelvic peritonitis. Credé of Leipzig quotes a case where he tapped a tumour and first got serum, then blood-stained serum, and finally blood. In two days, a fresh tapping first gave putrid blood and then fresh blood in abundance.

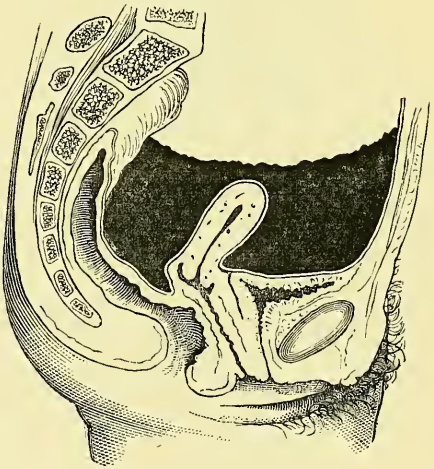

Fig. 118.

Copious Blood-effusion Ante- and Retro-Uterine.

(*b.*) *Connective tissue.*—Rupture of veins occurs here also.

(*c.*) *Uterus.*—We may have regurgitation in menorrhagia from the uterus along the dilated Fallopian tubes. Rupture of interstitial extra-uterine pregnancy is another cause of hæmorrhage.

(*d.*) *Fallopian tube.*—Blood may come from its hyperæmic mucous membrane and pass into the peritoneal cavity. Intra-peritoneal hæmatocele is often the result of the rupture of an early Fallopian-tube gestation intra-peritoneally (fig. 119). When it develops between the layers of the broad ligament, hæmatoma is the result.

(*e.*) *Ovary.*—Here it results from rupture of congested vessels, or of the Graafian follicles.

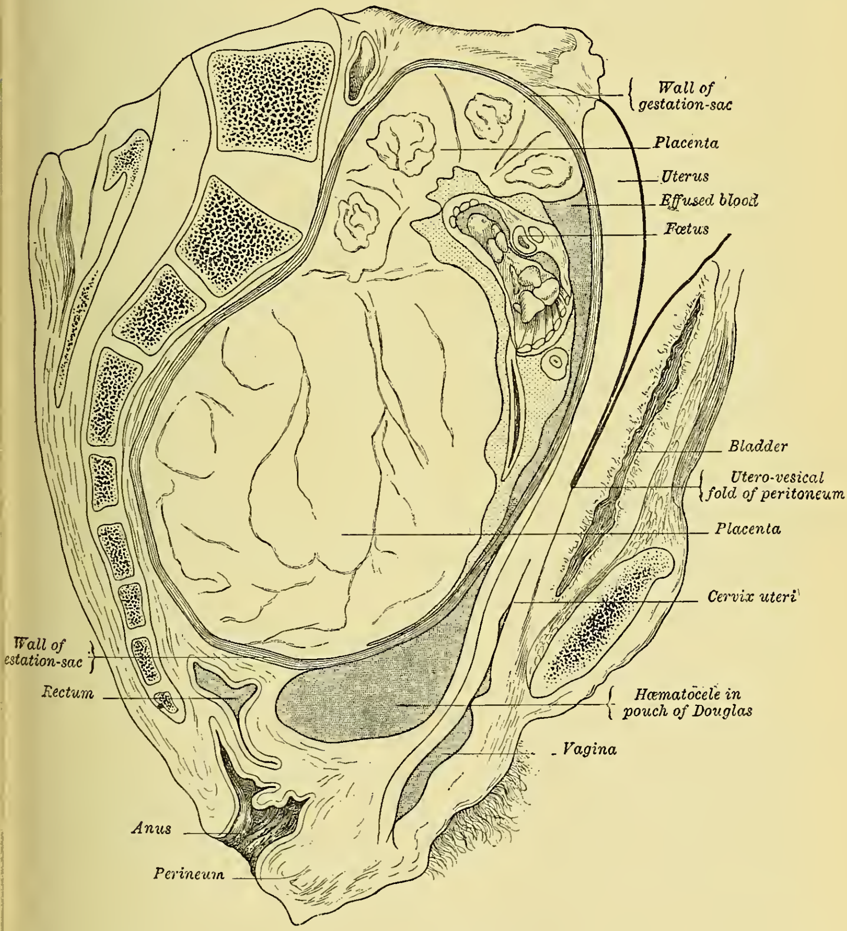

Fig. 119.

Recent Hæmatocele in Pouch of Douglas from rupture of a gestation-sac lying in it; the uterus, the cavity of which is not cut into, is closely incorporated with anterior wall of sac (*Barbour*).

Of all these causes, rupture of veins below the peritoneum, and rupture of Fallopian-tube pregnancies are the most common. The student will now clearly see the *symptomatic nature* of hæmatocele.

SYMPTOMS.

Symptoms. The chief symptoms are menorrhagia, sudden onset, sudden bloodlessness, pain. The pulse may become feeble from anæmia, and the temperature is not above normal. Menorrhagia is not always present, and the bloodlessness may not be very well marked; sometimes patients have a sudden faint feeling. In cases of copious effusion from rupture of an extra-uterine pregnancy, the symptoms are often like those of irritant poisoning: viz., sudden onset, prostration, vomiting. The marked anæmia, however, points to some internal hæmorrhage; inquiry should then be made as to menstruation, and this always followed by bimanual examination. In Fallopian-tube gestation the decidua may be discharged from the uterus before actual rupture.

In retro-uterine hæmatocele, we find frequent painful micturition and difficulty in evacuation of the bowels. There is sometimes retention of urine.

PHYSICAL SIGNS.

Physical Signs. These differ according as the effusion is intra- or extra-peritoneal.

Intra-peritoneal Hæmatocele.—When blood is poured out near the pouch of Douglas, we may get the following characteristic state. On abdominal percussion, dulness may be present. On vaginal examination, a resistant bulging tumour is felt, varying in size from that of a billiard ball to that of a child's head, and sometimes filling up a large part of the pelvic cavity; the os uteri is pressed close behind the symphysis, looks downward, and is often almost inaccessible (figs. 117 and 119). A good plan to get at it is to turn the index finger palmar surface to the symphysis, and push it well up. *On bimanual examination, the fundus uteri is felt unusually distinct, beneath the abdominal walls and above the pubes, and generally to one or other side.* This settles the point that the tumour is retro-uterine and not the uterus. The sound confirms the Bimanual as to the position of the uterus, but is not as a rule necessary.

Extra-peritoneal Hæmatocele: Pelvic Hæmatoma.—When the blood-effusion is poured out between the layers of one of the broad ligaments, we get displacement of the uterus to the opposite side, arched dulness on abdominal percussion to one or other side of the hypogastric region with bulging more or less marked in the lateral or posterior fornices (fig. 116). When the effusion is peri-uterine, we get the abdominal dulness more extensive and the bulging in the fornices all round the uterus. Pelvic peritonitis is often a result of the intra-peritoneal form of blood-effusion.

All that has been given here is only how to recognise intra-pelvic hæmorrhage, which is merely a symptom or sign of some lesion. The diagnosis of the lesion causing the hæmorrhage is, except in the case of extra-uterine pregnancy, as yet beyond our clinical knowledge.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

Diagnosis and Differential Diagnosis.

Pelvic hæmatocele requires to be diagnosed from—

Pelvic peritonitis followed by enclosed serous effusion in pouch of Douglas,
Pelvic cellulitis,
Fibroid on posterior wall of uterus,
Ovarian cyst behind uterus,
Extra-uterine pregnancy,
Retention of blood in horn of a malformed uterus,
Retroversion of non-gravid or gravid uterus.

Of these we consider at present only pelvic peritonitis and pelvic cellulitis. The others will be treated of each under its respective head.

In these two purely inflammatory affections we have the inflammatory symptoms from the first; without a history of sudden onset, of menorrhagia, or of the symptoms of internal hæmorrhage. Further, the difference in etiology of hæmatocele and peritonitis will help us. The history is the most important aid in diagnosis.

COURSE AND RESULTS.

Course and Results.

In many cases ($\frac{4}{5}$ according to Voisin) the blood effused becomes entirely absorbed, in a time varying from 2 to 10 months.

The tumour, with partially clotted or purulent contents, may burst into the rectum, vagina, or peritoneal cavity; in the last case, fatal peritonitis follows.

When the blood effusion is very large, death may be rapid.

PROGNOSIS.

Prognosis.

As to life.—This is, as a rule, settled soon. The most fatal cases are extra-uterine pregnancies, and those in which there are no peritonitic adhesions to limit the blood effusion. After peritonitis is set up, the prognosis is much as in pelvic peritonitis.

TREATMENT.

(1.) *At onset of hæmorrhage.*
(2.) *When suppuration occurs.*

Treatment.

(1.) *At onset of hæmorrhage.*—The treatment here is expectant. The patient is to be put at complete rest, with ice-bags to the abdomen. Ergotine should be injected into the buttock. The ice-bag is to be kept on for several days, as this will limit the subsequent peritonitis. If the patient is collapsed, then stimulants and hypodermic injections of sulphuric ether or whisky must be freely used; a large mustard poultice over the abdomen is often serviceable, both as a blood derivative and in allaying vomiting.

In most cases, the source of the bleeding is unknown; the present state of knowledge does not enable us to lay down any rule as to the opening of the abdominal cavity and the attempt to ascertain and secure the bleeding source. In Fallopian-tube pregnancies which have burst, however, the abdomen has been opened and the tube ligatured on either side of the rupture; Lawson Tait has operated successfully on forty-two cases of rupture of Fallopian-tube gestation, but always at some period after the rupture. Sinclair, Herman, and Berry Hart in this country, and Johnstone in America, have also operated successfully.

Martin has performed laparotomy in four cases successfully. He opens the abdomen, incises the sac, clears out clots, ties vessels, and drains. When possible, the opening of the blood sac should be stitched to the abdominal wound. Imlach of Liverpool has also recorded cases where he opened the abdomen and tied the Fallopian tubes along which blood had regurgitated. Accordingly, we may now look forward to an extension of more active interference by abdominal section. Zweifel has in several cases incised the tumour per vaginam, turned out the clots and drained the cavity. In Hæmatoma, when absorption is very slow, Gusserow has had good results by incising through the vagina, washing out, and draining. When absorption is going on, the treatment is the same as in pelvic peritonitis.

(2.) *After suppuration has occurred.*—The tumour is to be opened and drained, as recommended at p. 171 for suppurating pelvic cellulitis.

Recently, Lawson Tait has recommended that some pelvic abscesses be opened by abdominal section, as we often get very tedious cases when they perforate into the bowel. The following was the treatment in one of six cases in which he performed it. "I determined to open it from above. . . . I found a large cavity containing about two pints of fœtid pus with decomposing blood-clots. This I carefully cleansed out, and after having united the edges of the opening into the cyst carefully to the abdominal wound, I fixed in one of Kœberlé's drainage tubes five inches long. . . . The patient went home cured on the thirtieth day." Tait's cases were chiefly suppurating hæmatoceles (Tr. of Lond. Roy. Med. and Chir. Soc., vol. 62).

NEW GROWTHS IN THE PELVIC PERITONEUM AND CONNECTIVE TISSUE (BROAD AND ROUND LIGAMENTS).

LITERATURE.

PERITONEUM AND CONNECTIVE TISSUE: BROAD LIGAMENT. *Cobbold, W. A.*—Parasites: Churchill, 1879. *Freund, W. A.*—Das Bindegewebe im weiblichen Becken und seine pathologischen Veränderungen mit besonderer Berücksichtigung der parametritis chronica atrophicans und der Echinococcuskrankheit: Gynäkologische Klinik, Strassburg, 1885. *Freund and Chadwick*—Four cases of Echinococcus in the Female Pelvis: Am. J. of Obstet., 1874. *Hart, D. Berry*—Sarcoma of pelvic connective tissue in Atlas of Female Pelvic Anatomy: Edinburgh, 1884. *Neisser*—Die Echinococcuskrankheit: Berlin, 1877. *Schatz*—Die Echinokokken der Genitalien und des kleinen Beckens beim Weibe: Cent. f. Gyn., 44, 1886. *Simmons*—Malignant disease of female Sexual Organs: Edin. Med. Journ. Dec. 1885. Cobbold and Neisser give the literature on Echinococci fully and references to cases by Hewitt, Corrigan, Turner, Wynne, and others.

ROUND LIGAMENT.—*Goodell*—Lessons in Gynecology: Philadelphia, 1880. *Sänger*—Weitere Beiträge zur Lehre von den primären desmoiden Geschwülsten der Gebärmutterbänder, besonders der Ligamenta rotunda: Archiv f. Gyn. XXI. 279 and XXIV. 1. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1878, S. 417. *Thomas*—Diseases of Women: Philadelphia, 1880, p. 136. *Wile*—Hydrocele in the Female: Am. J. of Obst., July 1881, which see for further literature. *Winckel*—Lehrbuch der Frauenkrankheiten: Stuttgart, 1886.

TUMOURS OF THE BROAD LIGAMENT.

Tumours of Broad Ligament.

Hæmatoma and inflammatory conditions of the broad ligament have been already considered. We need only further mention that we may have cysts, fibroids (rare), phleboliths, cancer, and tuberculosis; the last two are only parts of the general peritoneal affection. Ovarian cysts may develop into the Broad Ligament, and cysts may develop in the Broad Ligament independently of the Parovarium. Cysts of the Broad Ligament will be considered along with Ovarian Tumours.

HYDROCELE OF THE ROUND LIGAMENT.

Hydrocele of Round Ligament.

Nature and Pathological Anatomy.—This is a rare malady, and may exist as encysted fluid about the round ligament (extra-peritoneal), or in the canal of Nuck — a process of peritoneum extending from the internal inguinal ring into the labium majus. It may be closed at the internal ring, thus forming a cyst; or it may communicate with the peritoneal cavity.

The fluid is serous in its nature; it may be olive-green in colour.

Physical Signs.—(*a*) *Of encysted hydrocele of the cord.* An oval translucent swelling exists in the inguinal canal. It cannot be returned into the abdominal cavity, has usually existed for some time, is not tender on pressure, and gives rise to no symptoms. It must be differentiated from an ovary in the inguinal canal, and from incarcerated hernia.

(*b.*) *Of hydrocele in the labium majus.* The labium majus is distended with a fluctuating tumour, dull on percussion and of translucent appearance; usually, the contents cannot be returned into the abdominal cavity. Aspiration gives a clear fluid. It is to be diagnosed from hernia in the usual way.

Treatment.—Aspiration and drainage; or aspiration and injection of a few drops of tincture of iodine. Goodell recommends that when the labial form communicates with the abdominal cavity, the internal ring should first be firmly compressed and the injected fluid then sucked out.

TUMOURS OF THE ROUND LIGAMENT.

Tumours of Round Ligament.

Fibrous, myomatous, sarcomatous tumours, and their combinations, have been described in the round ligament by Sänger. They may develop in any part of its course: intra-peritoneally; within the inguinal canal; or extra-peritoneally—in the abdominal wall, the pelvic cellular tissue or the labia majora. Such tumours are rare, those of the third group (extra-peritoneal) being the most frequent. They may be removed unless dipping down into the pelvis.

ECHINOCOCCI IN THE PELVIC ORGANS.

Echinococci in Pelvic Organs.

Echinococci or Hydatids are the sexually immature forms of the Tænia echinococcus, a small tapeworm found in the intestines of the dog. When present in the human body, they form elastic tumours and may occur in the female pelvic organs.

Freund, in 25 years, met with 19 cases—of which 7 were in the pelvic connective tissue: while Schatz met with 6 out of 7000 gynecological and obstetric cases (1 in 1166). Schatz has also collected 66 cases of Echinococcus disease in the female pelvic organs and found the frequency as follows:—14 in uterus, 14 at pelvic brim, 10 in Douglas' pouch, 7 in ovary, 7 in broad ligament, 7 in pelvic connective tissue, 5 between rectum and vagina, 2 between bladder and vagina.

They may remain many years without symptoms or may perforate into bowel or bladder. When large, they cause pressure *symptoms* on bladder and rectum. The *physical signs* are those of a tense elastic tumour without pain; at first, usually situated near the rectum; and ultimately, when increased in size, displacing the pelvic organs as an ovarian tumour would when developing between the layers of the broad ligament, *i.e.* first forwards and then upwards. The *diagnosis* is often difficult and tapping may be requisite. When they project sufficiently into the abdomen, the treatment is laparotomy with shelling out of the tumour; or incision of the sac, with careful cleansing and stitching the edges to the abdominal incision (*v.* Abdominal Section in Appendix). When pelvic, the sac is opened and drained (*v.* pp. 171–2). Hydatids are rare in this country, but common in Iceland and Australia (Cobbold).

TUMOURS OF THE PELVIC CONNECTIVE TISSUE.

Tumours of Pelvic Connective Tissue.

We may have fibromyomata, sarcomata, or dermoid cysts as primary conditions in the pelvic connective tissue.

Fig. 120 shows the pelvis from an interesting case of primary sarcoma which began in the connective tissue at the left side of the uterus and spread through the lymphatic glands. This case presented the following points of interest.

A. B., æt. twenty-seven, was an undersized, wretchedly thin girl, who had felt unable for her usual occupation of a domestic servant; but the medical man whom she had consulted had been unable at first to find anything tangible to account for her condition. Afterwards, however, the inguinal glands of the left groin (those parallel to Poupart's ligament) began to be enlarged, and the left leg was painful and somewhat swollen. In the vast majority of cases, enlargement of the inguinal glands parallel to Poupart's ligament means some irritation in the external genitals or lower fourth of the vagina, an irritation either syphilitic, gonorrhœal, or cancerous. The external genitals and vagina were in this girl, however, perfectly healthy, and the condition of the parts was, further, virginal. Deep palpation of the left iliac region gave a sense of resistance at the left margin of the true pelvis; and, on bimanual examination of the pelvic organs, the normal-sized uterus was lying close to the right margin of the true pelvis; at the left side of the true pelvis could be felt a firm resisting mass, about the size of half a cocoanut. It seemed firmly fixed to the pelvic wall, and gave no feeling of fluctuation. Any operation was hopeless, and one could only palliate the pain by large doses of morphia given hypodermically.

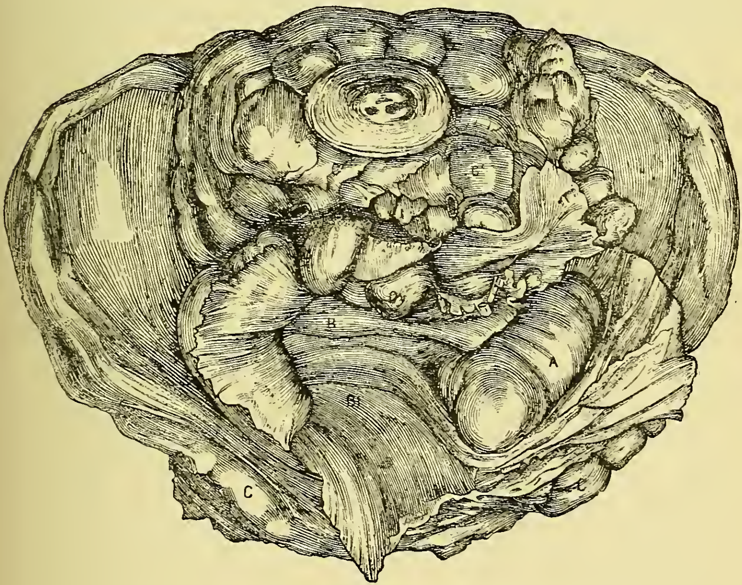

Fig. 120.

Sarcomatous Tumour of the Pelvic Connective Tissue (*Hart*).
A Tumour, B Uterus, Bl Bladder, Ov Ovary, c c Inguinal and c′ c′ Sacral Lymphatic Glands.

The girl died miserably about six months afterwards. On post-mortem the pelvis was removed, and fig. 120 gives a view of the parts as seen through the brim. The displaced uterus (B), subperitoneal malignant mass (A), enlarged inguinal glands on both sides (C C), and the large mass of the sacral glands (C′ C′) are well seen. On more minute examination, the enlarged obturator glands were found, as well as the sacral ones in front of the sacrum. The primary tumour (A) did not communicate directly with the enlarged left inguinal glands. Microscopical examination showed it to be a round-celled sarcoma. This case illustrates not only a rare form of pelvic disease but also lymphatic communication between the obturator glands and those of the inguinal glands parallel to Poupart's ligament.

Sarcoma may also arise in the recto-vaginal septum and produce a swelling simulating, from its position and the displacement caused by it, a retro-uterine tumour in the pouch of Douglas.

SECTION IV.

AFFECTIONS OF THE FALLOPIAN TUBES AND OVARIES.

Chapter XIX. Affections of Fallopian Tube and Parovarium.

„ XX. Malformations of Ovary: Ovaritis and Periovaritis: Displacements of Ovary—Hernia, Prolapsus.

„ XXI. Operations for Removal of Fallopian Tubes and Ovaries.

„ XXII. Pathology of Ovarian Tumours.

„ XXIII. Diagnosis of Ovarian Tumours.

„ XXIV. Operative Treatment of Ovarian Tumours.

CHAPTER XIX.

AFFECTIONS OF FALLOPIAN TUBE AND PAROVARIUM.

LITERATURE.

Bandl—Die Krankheiten der Tuben, etc., Billroth's Handbuch: Stuttgart, 1879. *Barnes*—Diseases of Women: London, 1878, p. 376. *Doran*—Clinical and Pathological Observations on Tumours of the Ovary, Fallopian Tube, and Broad Ligament: London, 1884. *v.* also Trans. Path. Soc., Lond., 1887; and Trans. of Lond. Obst. Soc., 1887. *Duncan*—Diseases of Women: Lond., 1882. *Fowler, J. K.*—Hydro- and Pyo-Salpinx: Med. Times and Gazette, 1884. *Freund*—Ueber die Indikationen zur operativen Behandlung der erkrankten Tuben: Volk. Samml., No. 323. *Griffiths*—Tubo-ovarian Cysts: Trans. Lond. Obst. Soc., 1887. *Hennig*—Krankheiten der Eileiter und die Tubarschwangerschaft: Stuttgart, 1876. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane: Wien, 1874. *Lewers*—On the Frequency of Pathological Conditions of the Fallopian Tubes: Trans. of Lond. Obst. Soc., 1887. *MacDonald, Angus*—Ten Cases of Laparotomy: Ed. Med. Journ., June 1885. *Martin*—Ueber Tubenerkrankung: Zts. für Geb., Bd. XIII., S. 299. *Noeggerath*—The Vesico-vaginal and Vesico-rectal Touch: Am. J. of Obst., VIII.. p. 123. *Sänger*—Etiology, Pathology, and Classification of Salpingitis: Amer. Jour. of Obst., 1887, p. 317. *Simpson, Sir J. Y.*—Diseases of Women (Edit. A. R. Simpson), p. 539. *Schroeder*—Handbuch der Krankheiten, etc.: Leipzig, 1878, S. 329. *Tait*—Menstrual Fluid retained in the Left Fallopian Tube simulating Ovarian Tumour: Br. Med. J., 1878, p. 677. The Pathology and Treatment of Diseases of the Ovaries: Birmingham, 1883. Note on Chronic Inflammatory Disease of the Uterine Appendages: Ed. Med. Jour., Sept. 1885. *Thomas*—Diseases of Women: Philadelphia, 1880, p. 760. *Wells, Sir T. S.*—Diseases of Ovarian and Uterine Tumours: London, 1882. *Williams*—Ovarian Tumours: Reynold's System of Medicine, Vol. V. *Winckel*—Die Pathologie der weiblichen Sexualorgane: Leipzig, 1881. *Wylie, W. G.*—Operations for Salpingitis: N. Y. Medical Record, Aug. 29th, 1885. *Zemann*—Ueber die Aktinomykose des Bauchfells und der Baucheingeweide beim Menschen: Medicin. Jahrbücher der K. K. Gesellschaft der Aertzte in Wien, 1883, S. 477. For other literature see Bandl and Doran, whose works and that of Hennig we mainly follow: see also the Index of Recent Gynecological Literature in the Appendix.

FALLOPIAN TUBE.

Fallopian Tube.

Preliminary Considerations.—The anatomical relations of the Fallopian tubes have been already considered (p. 22). Functionally, they act as ducts along which the ovum, fertilised or non-fertilised, is carried to the uterine cavity; and up which some believe the spermatozoids pass to fertilise the ovum. So far as we know this is all their physiological function, unless we hold with Tait that they play some important though as yet undefined part in menstruation. Pathologically, the Fallopian tubes are important from the occurrence of extra-uterine pregnancy in them and their not infrequent dilatation with pus or blood. From the fact that they open on the one hand into the uterus and on the other hand into the peritoneal cavity, very serious results may follow from fluid accumulations in them; as also from spreading gonorrhœa, or from injections into the uterus. It is of great interest to note the fact that the majority of inflammatory pelvic affections lie posterior to the broad ligaments, suggesting their etiological relations to Fallopian-tube disease.

Can the normal Fallopian tubes be palpated in the Bimanual? The student will probably have already noted that, in considering the Bimanual (Chap. VIII.), we did not name the Fallopian tubes as structures whose form and limits he was expected to define. In a very favourable case, the conjoined manipulation may recognise them at their uterine origin more especially if the rectal examination be made and the uterus be well drawn down with the volsella. Nœggerath has pointed out that they may be defined in those cases where the finger is passed along the urethra to explore the interior of the bladder, an operative procedure to be described afterwards. Practically, the Fallopian tubes (unless much dilated) are not palpable on ordinary examination. It must not be forgotten that many cases have now been recorded, where abdominal section showed the Fallopian tubes to be dilated with pus to the size of coils of small intestine, although the most careful Bimanual had failed to detect their presence.

Catheterisation of Tubes.

Catheterisation of the tubes.—In certain undoubted cases the uterine sound has been passed along the Fallopian tube, while in others the supposed sounding of the tube has been really the perforation of the uterine wall. It is impracticable to sound the normal Fallopian tubes to any effect; and the procedure is by no means devoid of danger.

We now consider their pathological conditions under the following heads:—

Abnormalities,
Stricture and Occlusion,
Patent condition,
Inflammatory conditions,
Hydrosalpinx,
Pyosalpinx and Hæmatosalpinx,
New Formations, Tubo-ovarian Cysts.

ABNORMALITIES.

Abnormalities.

These are of little practical interest. The chief are an accessory fimbriated end; defective development; displacement; want of apposition of fimbriæ to ovary (Lawson Tait).

STRICTURE AND OCCLUSION OF THE TUBES.

Stricture and Occlusion.

The tube may have a congenital stricture; or may become closed at the uterine or the fimbriated end, or in the middle. When stricture occurs at the uterine end, it is caused by implantation of the placenta there or by endometritis with adhesion. In the middle, small tumours or adhesions may cause strictures—in the latter case usually partial. At the fimbriated end, the occlusion is due to a catarrh of the tubes which has spread to the peritoneum and set up adhesive peritonitis.

These strictures are of importance in relation to sterility and fluid accumulations (pus, serum, blood) which they favour; but in themselves cannot be diagnosed during life.

PATENT CONDITION OF THE TUBES.

Patency.

By this is meant undue dilatability. It is of great importance in relation to uterine injections. Even in careful injection of the uterine cavity, post partum or otherwise, fatal results have followed from the fluid's passing along the tube into the peritoneal cavity. "Forcible uterine injections on the cadaver, with the cervix entirely filled up by the syringe, almost always sent fluid along the tubes into the peritoneal cavity. Less forcible injections under like conditions sent the fluid along a less distance (2-3 mm.), and often sent it into the veins; while gentle injections with a tube not filling the cervical canal sent fluid neither into the tubes nor veins." Bandl, from whom the above is taken, records a case where death resulted from injection of an aborting uterus with perchloride of iron, although the injection pipe was less in

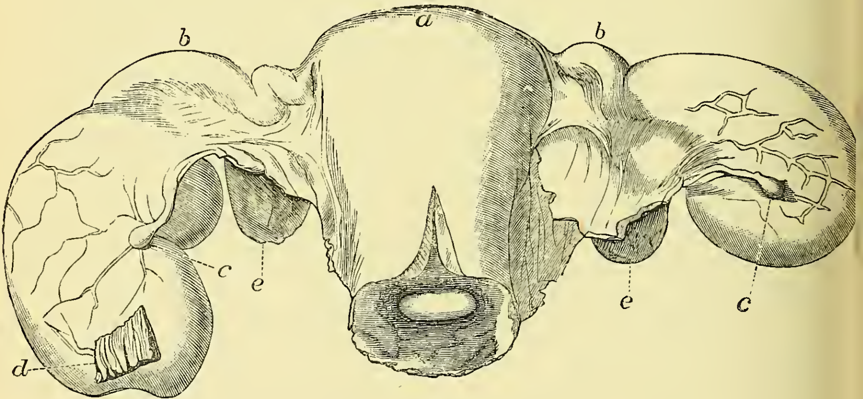

FIG. 121.

HYDROPS TUBÆ: *a* Uterus with Cervix laid open in front; *bb* Fallopian Tubes; *cc* hydrops; *d* part of an inflammatory adhesion; *ee* ovaries (*Hennig*).

diameter than the cervix. Death may be immediate from shock, or some days after from peritonitis. In uterine injections, no more than 1-4 drops should be used.

Winckel has recorded a unique case where a round worm (Ascaris Lumbricoides) was found calcified on the posterior surface of the uterus and left broad ligament. It had probably passed from the anus into the vagina and ultimately through the Fallopian tube into the peritoneal cavity.

INFLAMMATORY CONDITIONS OF THE TUBES, SALPINGITIS.

Salpingitis.

The Fallopian tube has three layers—peritoneal, muscular, and mucous. An inflammatory condition of the peritoneum (perisalpingitis) is simply part of ordinary pelvic peritonitis, is not diagnosable, and is not in itself of any importance. The same may be said of meso-salpingitis (inflammation of the muscular coat). The most important changes occur in the mucous membrane.

Pathology.—The pathology of these changes is not by any means thoroughly worked out, and our knowledge is specially deficient in regard to the part played by micro-organisms in its production. We here briefly take up the varieties mentioned below, following Sänger's classification.

Group I.—*Forms of Salpingitis produced by known specific microbes.*

1. *Salpingitis gonorrhoica*, produced by the gonococcus of Neisser;
2. *Salpingitis tuberculosa*, produced by the bacillus tuberculosis of Koch;
3. *Salpingitis actinomycotica*, produced by the actinomyces bovis of Bollinger.

1. *Salpingitis gonorrhoica.*—This is held by many to be the most frequent form. It should be kept in mind, however, that the gonococcus is not by any means readily demonstrated in the secretion of the tubes in these cases, probably because the organism is in greater part destroyed by the leucocytes. The history is here at present our great guide to the special diagnosis.

2. *Salpingitis tuberculosa* is now thoroughly proved, thanks to Koch's discovery, by the presence of the bacillus tuberculosis. To the naked eye, the tubes appear somewhat enlarged and beaded.

3. *Salpingitis actinomycotica.*—This is a pathological curiosity, but has been demonstrated by Zemann.

Group II.—*Forms of Salpingitis due to specific microbes identical with those producing traumatic infection.*

4. *Salpingitis septica.*—No special microbes have been demonstrated here, but they are in all probability identical with those found to cause

acute suppuration, viz., streptococcus pyogenes and staphylococcus pyogenes. This form follows abortion, puerperal fever, and use of tents or stem pessaries.

GROUP III.—*Forms of infectious Salpingitis produced by specific but as yet unknown microbes.*

5. *Salpingitis syphilitica* is the chief one of this group.

Another classification is that of Martin into—

1. *Salpingitis catarrhalis, Endosalpingitis;*
2. *Salpingitis interstitialis;*
3. *Salpingitis follicularis.*

In the first, we have small-celled infiltration causing thickening of the mucosa; in the second, the same chiefly affects the muscular coat; while in the third, the spaces in the mucous membrane of the tube caused by the folding of the mucous coat are dilated.

Treatment.—This will be considered under the Treatment of Pyosalpinx.

HYDROSALPINX OR HYDROPS TUBÆ.

Hydrosalpinx.

As the result of stricture of the tube and marked catarrh, we get the tube distended with serum (hydrosalpinx) or pus (pyosalpinx).

Pathological Anatomy.—The whole or only a part of the tube is dilated, according to the locality of the stricture (fig. 121). There may be several strictures and thus several cysts. The tube distends and atrophies, so that the mucous membrane becomes thin and the muscular coat disappears. The fluid is usually serum with cholesterin, and occasionally blood.

It is alleged that fluid can accumulate in the tube although the uterine end is open; the fluid at a certain stage of its accumulation flows into the uterus (profluent dropsy of the tube).

Physical Signs. — An elongated tortuous tube is found at one side of the uterus and high up in the pelvis. Usually a small piece of the undilated tube can be felt between the sac and the uterus.

The *Differential Diagnosis* must be made from the following:—

(1.) Inflammatory conditions or blood extravasation in the broad ligament,
(2.) Fallopian-tube pregnancy,
(3.) Small ovarian cyst,
(4.) Parovarian cyst,
(5.) Retention of blood in malformed uterus.

Treatment.—When the dilated tubes are free or but partially adherent, they may be removed by abdominal incision (*v.* Pyosalpinx).

PYOSALPINX.

Pyosalpinx arises when the fimbriated end of the tube is closed and the secretions thus retained. The usual explanation is that the pus exuding from the ostium abdominale of the tube sets up a limited pelvic peritonitis and thus closes it. The tube so distended may rupture into the peritoneal cavity with a fatal result. Pyosalpinx.

Until recently it was not believed that the Fallopian tubes played an important part in diseases of women. Lawson Tait's abdominal sections, however, reveal the fact that Pyosalpinx is present in a number of cases hitherto unsuspected. Although this was not believed at first, it has been amply proved not only by abdominal sections of other gynecologists, but also by careful post mortem examination. J. K. Fowler found in the post mortem record for 3 years of the Middlesex hospital, 15 cases of pyosalpinx; in 8 of these, it had been the cause of death. Tait's statements have therefore been fully borne out.

When *acute*, the disease may run its course rapidly from general peritonitis. Indeed in cases of general peritonitis, this lesion should be kept in mind; and Tait believes we may save such "by boldly opening the abdomen and cleansing its cavity." In *chronic* cases, there has probably been some attack of ovaritis or peri-ovaritis, with occlusion of the fimbriated end of the tube, and accumulation of inflammatory secretion.

Symptoms.—It is not possible at present to give any very accurate symptomatology of this disease. The cases are usually chronic, have been under many gynecologists, and not improved under treatment. Pain, intolerable dysmenorrhœa, recurrent attacks of pelvic peritonitis, probably due to the escape of pus from the ostium abdominale of the tube into the peritoneal cavity, and a chronicity of the symptoms should lead one to suspect pyosalpinx. The history often helps, as in many cases we find that gonorrhœal infection has started a specific vaginitis which has spread until the Fallopian tubes have become seriously involved. Menstruation is irregular—usually increased both in amount and frequency. Symptoms.

There have also been described recurrent lateral swellings in the region of the uterus, their disappearance being accompanied sometimes with an escape of pus from the vagina. These are probably cases of pyosalpinx discharging periodically through the uterine cavity.

Physical Signs.—Bimanually one finds swellings in the site of the tubes, and can make out occasionally that these are sausage-like in form. Pain is felt on examination. Lawson Tait, to whose work on Diseases of the Ovaries we are indebted for the symptomatology and physical signs, narrates several cases of which the two following are examples.—

"E. C.——, aged thirty-two, was married at seventeen years of age, and had her first child when she was eighteen, and her second in the following year. She was quite well until 1876, when she had a smart attack of inflammation of the pelvis, and ever after that she had extreme pain at her periods, when she had to remain in bed for several days; and she described her sufferings as amounting to agony, and resembling labour-pains more than anything she knew of. She was seldom free from pain in the back, and for the last three years she has been utterly unable to endure married life. I found the uterus slightly retroverted, and on each side of it there was a distinct mass in the position of the ovary, large, fixed, and extremely tender. She had been under a great variety of treatments, without the slightest benefit. On October 5th, 1880, I made an exploratory incision, and found both ovaries adherent in the cul-de-sac, the infundibula of both tubes occluded, and the tubes themselves distended into cysts. The whole of the organs were matted together, and the operation for their complete removal was extremely difficult. The amount of fluid in each tube was about two ounces. She made an uninterrupted recovery from the operation until the monthly period after, at which time she had a small hæmatocele on the right side, coincident with a slight menstrual appearance. From this, however, she speedily recovered, and on February 17th last I found the uterus perfectly free and normal in direction, I last saw her on March 26th, and found her in perfect health, absolutely free from pain, and she told me that she had seen no appearance of menstruation since November, and that marital functions had been resumed without the slightest pain.

"H. S.——, aged thirty-seven, had been married seventeen years, and had only one child, fifteen years ago. She did not recover well from that confinement, and ever since had menstruated too often and too profusely, being rarely a fortnight clear. I found the fundus large and tender, somewhat anteverted, and what I regarded as the ovaries formed two large masses low down, and somewhat behind the uterus. For a long time past, sexual intercourse had been impossible on account of the suffering it caused her. Dr C. H. Phillips of Hanley, who placed her under my care, had exercised a large amount of ingenuity in her treatment without any benefit, and from February till August 1880, we conducted further treatment equally in vain. On August 3rd, I opened the abdomen, and found the ovaries large, completely adherent in the cul-de-sac, covered with lymph, and having the infundibula of the tubes occluded. The tubes were distended into large cysts, each containing from four to five ounces of clear serum. The organs had to be very carefully detached, as the adhesions were extremely firm, and the hæmorrhage during the operation was tolerably profuse. Her recovery from the operation was rapid and easy, and the only distresses she encountered were the climacteric flushings. In May last, Dr Phillips sent me a most satisfactory account of her condition."

Treatment.

Treatment.[1]—The treatment hitherto advised in such cases has been to tap. Lawson Tait has introduced abdominal section with removal of the tubes, and has proved that this is the safest and best method of treatment. He makes a small abdominal incision, frees adhesions by manipulation with the fingers, and taps any cysts with a long curved trocar guided by the fingers. When adhesions are thus broken down, he brings up the tubes to or through the abdominal incision, ligatures with the Staffordshire knot, cuts away the parts above the ligature, drops the pedicle and drains with a glass tube. Where he cannot remove the tube, he stitches the opening in it carefully to the abdominal incision. Some operators, especially in Germany, make a larger incision, apply ligatures to adhesions, and do not hesitate to turn out the small intestines (suitably covered with warm towels) to facilitate this.

HÆMATOSALPINX.

Hæmatosalpinx.

This is a rare condition in which the blood from the congested mucous membrane of the tube is detained and dilates it. It is often associated with retention of menstrual blood in the uterus (*v.* Atresia Vaginæ, Section VI.). *Diagnosis* is difficult; Bandl records one case where he diagnosed the condition as a fibroid; and Lawson Tait, one simulating a parovarian cyst, in which he did abdominal section and removed six quarts of thick dark brown fluid.

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[1] See also the chapter on Abdominal Section in the Appendix.

NEW FORMATIONS: TUBO-OVARIAN CYSTS.

New Formations.

The most important *new formations* are connective-tissue growths, fibroma, lipoma, primary tuberculosis, carcinoma. In tuberculosis of the Fallopian tube, Steven has found, sparingly distributed, the bacillus tuberculosis recently discovered by Koch in tubercular phthisis of the lungs (Glas. Med. J., Jan. 1883). In 46 cases of tuberculosis of the female genital organs, the tubes were affected in 34 (Mosler).

Tubo-ovarian cysts result from adhesions between the fimbriated end of the Fallopian tube and the ovary, with degeneration of the corpora lutea of the Graafian follicles thus enclosed. The contents may be poured into the uterus along the tube.

PAROVARIUM.

Parovarium.

The diagram shewn at fig. 122, taken from Doran's interesting and

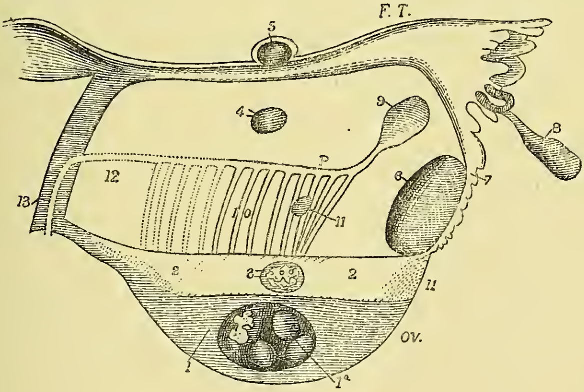


FIG. 122.

DIAGRAM OF THE STRUCTURES IN AND ADJACENT TO THE BROAD LIGAMENT (*Doran*).

1. Framework of the parenchyma of the ovary, seat of a simple or glandular multilocular cyst. 2. Tissue of hilum, with 3, papillomatous cyst. 4. Broad ligament cyst, independent of parovarium and Fallopian tube. 5. A similar cyst in broad ligament above the tube, but not connected with it. 6. A similar cyst developed close to 7—ovarian fimbria of tube. 8. The hydatid of Morgagni. 9. Cyst developed from horizontal tube of parovarium. Cysts 4, 5, 6, 8, and 9 are always lined internally with a simple layer of endothelium. 10. The parovarium; the dotted lines represent the inner portion, always more or less obsolete in the adult. 11. A small cyst developed from a vertical tube; cysts that have this origin, or that spring from the obsolete portion, have a lining of cubical or ciliated epithelium, and tend to develop papillomatous growths, as do cysts in 2—tissue of the hilum. 12. The canal of Gartner, often persistent in the adult as a fibrous cord. 13. Track of that duct in the uterine wall; unobliterated portions are, according to Coblenz, the origin of papillomatous cysts in the uterus.

valuable work, shews that the Parovarium, which is the remains of the Wolffian bodies, consists of a horizontal tube and 8 or 10 well-developed vertical tubes with 5 or 6 in addition represented only by fibrous threads. The horizontal tube may be traced (12, Fig. 122) to the side of the uterus forming the canal of Gartner already alluded to (page 23). It is important to observe that the vertical tubes become lost in the hilum of the ovary; the significance of this will be referred to under ovarian tumours. The tubes are lined with cubical or broken-down epithelium, and may give rise to the tumours known as parovarian (9, 11, Fig. 122).

This form of tumour is usually produced by *the distension* of one or more, usually one, of the tubules; its mode of production may however be like that of papillomatous ovarian tumours in which true tumour-growth takes place. The diagnosis and treatment of parovarian tumours will be best considered along with those of ovarian (*v.* Chaps. XXIII. and XXIV.).

CHAPTER XX.

MALFORMATIONS OF OVARY: OVARITIS: PERI-OVARITIS: DISPLACEMENTS OF OVARY—HERNIA, PROLAPSUS.

LITERATURE.

Barnes—Diseases of Women, p. 297: Lond. 1878. On Hernia of the Ovary, and Observations on the Physiological Relations of the Ovary: Am. J. of Obst. XVI. p. 1, 1883. *Engelmann*—The dry Treatment in Gynecology: Amer. Jour. of Obst., June and July 1887. *Englisch*—Oesterr. Med. Jahrbuch, 1871, p. 335; or, Sydenham Year Book, 1871–72, p. 293. *Freund*—Die Lage und Entwickelung der Beckenorgane: Breslau, 1863. *Herman*—Prolapse of the Ovaries: Med. Times and Gazette, 22d October 1881. *His*—Die Lage der Eierstöcke in der weiblichen Leiche: Archiv für Anatomie und Physiologie, Anat. Abtheilung, 1881. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane: Wien, 1864. *Lebedinsky*—Ovarien bei Scharlach: Centralb. f. Gyn. I. *Mundé*—Prolapse of the Ovaries: Am. Gyn. Tr., 1879, p. 164. *Olshausen*—Die Krankheiten der Ovarien: Billroth's Handbuch, Stuttgart, 1879. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1878, S. 341. *Schultze*—Zur Kenntniss von der Lage der Eingeweide im weiblichen Becken: Arch. f. Gynäk, Bd. ix. S. 262. *Slavjansky*—Die Entzündung der Eierstöcke: Arch. f. Gyn. Bd. iii. S. 183. *Tait, Lawson*—The Pathology and Treatment of Diseases of the Ovary: Birmingham, 1883.

WE first take up some preliminary considerations.

Examination of Ovaries.

Palpation of Normal Ovaries.—After the student has had practice in the Bimanual, he will probably meet with some favourable case where he is able to feel the normal-sized ovary. This is best done as Schultze recommends. To map out the right ovary, use the index and middle fingers of the right hand internally and the left hand externally; for the left ovary, the left hand is used internally and the right externally. The patient should lie on her back, with the knees drawn up and the legs rotated outwards. This rotation of the knees renders the psoas muscles tense, thus making their inner edges (which Schultze gives as a guide to the position of the ovaries) more easily palpable. Normally, they lie at about the level of the pelvic brim, half way between the Fallopian-tube angle of the uterus and the psoas (*v.* pp. 25, 57, 58).

Another method of palpating the ovaries is to draw down the uterus with the volsella, and make the examination with the finger per rectum.

MALFORMATIONS OF OVARY.

Malformations of Ovary.

Absence of one or both ovaries or rather their very rudimentary development, is generally only part of maldevelopment of the uterus.

Occasionally a third ovary is present—a fact worth keeping in mind in relation to Battey's operation (Chap. XXI.).

OVARITIS.

Ovaritis.

SYNONYM—Oöphoritis.

NATURE—An acute or chronic inflammation of the ovary.

Simple *Hyperœmia* of the Ovary may also occur.

PATHOLOGICAL ANATOMY.

Pathological Anatomy.

Acute ovaritis.—Of this we recognise two forms corresponding to the two subdivisions of ovarian tissue—the follicular or parenchymatous, and the interstitial.

In the *follicular form*, the ovary is not much enlarged; but we find on microscopical examination the peripheral follicles increased in size, their contents turbid or purulent, the cells of the membrana granulosa and the ovum in a state of cloudy swelling. The zona pellucida becomes thickened and folded. Usually the surrounding tissue participates, though to a less marked degree, in the inflammatory changes; and in marked cases the germ-epithelium becomes cloudy and broken down, with fibrinous deposits on its surface.

Lebedinsky has examined the changes in the ovary in scarlet fever. To the naked eye, there was no difference; but on microscopic examination, the Graafian follicles were found altered with cloudy swelling or destruction of the epithelium. The younger follicles were most markedly affected, but the stroma was unaltered. In this way the follicles become destroyed and cicatrized, and the ovarian function thus greatly impaired.

In the *interstitial form*, the ovary is increased in size and its connective-tissue elements are proliferated. Pus may form, and often there are small apoplexies. Slavjansky speaks of the following varieties of the interstitial form: serous, suppurative, hæmorrhagic, and necrotic.

Chronic ovaritis.—As the result of this, we get destruction of the follicles and a cirrhotic condition of the organ, as was found in a case of Tait's examined by Doran. To the naked eye, the ovaries appeared markedly fissured on the surface. Occasionally the ovary remains distinctly larger. Whether or not we get a super-involution of the uterus as the result of severe and double ovaritis, is not as yet settled. The ovaries may be small and cystic, and according to Tait this form gives rise to severe menorrhagia.

ETIOLOGY.

Etiology.

The causes of ovaritis are the following:—

1. Chill at menstrual period;

2. Gonorrhœa, latent gonorrhœa in the male;
3. Instrumental exploration of the uterus;
4. Childbirth and abortion;
5. Acute febrile disease;
6. Pelvic peritonitis.

Gonorrhœa.—The ovaries may be inflamed sympathetically, just as the testicles are in gonorrhœa of the male.

Instrumental exploration.—Sometimes after the passage of the uterine sound, especially in difficult cases, the ovary becomes tender.

Childbirth and abortion.—This is a common cause of ovaritis. Thus, in 27 cases at Halle, Olshausen found the ovaries affected in 13. Usually both ovaries are implicated.

Acute febrile diseases.—Cholera, the exanthemata, septicæmia, and phosphorus and arsenic poisoning have ovaritis as one of their results.

Pelvic peritonitis.—It will readily be understood that ovaritis often occurs as part of general pelvic peritonitis.

The follicular form usually occurs in febrile diseases and pelvic peritonitis; the interstitial form is generally puerperal.

SYMPTOMS AND PHYSICAL SIGNS.

Symptoms and Signs.

Acute ovaritis.—A case of simple acute ovaritis is not common. The patient usually complains of pain at the side radiating to the back, and of pain on pressure in the iliac regions.

When the Bimanual is made, the ovary or ovaries are unusually accessible, and are felt as mobile, tender, and somewhat enlarged bodies, often about the size of a walnut; and pressure causes great pain of a sickening character. Owing to adhesions, the mobility may be wanting.

Chronic ovaritis.—The symptoms and physical signs are as in the acute form, but much less marked and with a chronic history. Menorrhagia is often present. Sympathetic pain is sometimes felt below the left mamma. In some cases a form of epilepsy is brought on (menstrual epilepsy), menstruation being in abeyance.

DIFFERENTIAL DIAGNOSIS.

Differential Diagnosis.

When the ovary is not fixed, there is nothing else with which it can be confounded.

PROGRESS AND RESULTS.

Progress and Results.

We may have resolution of the affection, adhesion, suppuration, and abscess. Sterility is a frequent result of double ovaritis; hysteria is often present.

TREATMENT.

Treatment when Acute.

Acute ovaritis.—A fly blister should be applied over the appropriate iliac region, and the hot vaginal douche frequently used. Bromide of potassium may be given as follows.

℞. Potassii Bromidi gr. xxx to ʒi.
Fiat pulv: tales xii.
Sig. One powder at night.

Treatment when Chronic.

Chronic ovaritis—The hot douche and occasional blisters are best. The glycerine plug is of value.

Glycerine Plug.

A glycerine plug is made as follows: Take a square piece of absorbent cotton wool about the size of the palm of the hand; pour on its centre about ℥ss. glycerine; turn the corners over and squeeze the whole so as to saturate it; lastly, tie a piece of thread about 8 inches long round it. Pass Sims' or Fergusson's speculum, and place the plug in the fornix below the ovary. It should be left in for 18 to 24 hours, and then withdrawn.

This plug reduces congestion, owing to the affinity of glycerine for water; has an antiseptic action; and, as we shall afterwards see, forms an admirable pessary. It sets up a watery discharge, so that the patient should be told to wear a diaper.

A tampon of non-absorbent cotton wool dipped in bismuth or any mild antiseptic powder may be substituted for the glycerine tampon. It is passed with the aid of a speculum, and should be smeared at its upper part with vaseline. It does not become hard like the glycerine plug, and the elasticity of the non-absorbent wool is of benefit.

The following mixture is of use.

℞. Potassii Bromidi	ʒij.
Potassii Iodidi	ʒj.
Inf. Gentian. Co.	℥vi.

Sig. Tablespoonful thrice daily.

In menorrhagia uncontrollable by ordinary means, oöphorectomy may be performed (Chap. XXI.).

PERIOVARITIS.

Peri-ovaritis.

By this we understand an inflammatory affection of the tissues surrounding the ovary, which fixes the organ. It is a convenient clinical term for local peritonitic inflammations at the site of one of the ovaries. It is higher up than the usual cellulitic deposit. The treatment is the same as in chronic ovaritis.

DISPLACEMENTS OF THE OVARY—HERNIA.

Hernia of the Ovary.

The term *Hernia* is limited to those cases where the ovaries are present in the inguinal canals, in the obturator foramen (rare), or as part of an abdominal hernia. Percival Pott's case, where this first condition existed and where he excised both of the displaced organs, is the classical instance of this displacement. The usual form is where they are present in the *inguinal canal.*

ETIOLOGY.

Etiology.

Ovaries in the inguinal canal are usually congenital, having descended along the unobliterated process of peritoneum. In 17 cases out of 23 cases, Englisch found it to be congenital; and in one-third of these, the hernia was double.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

Diagnosis.

An oval tumour of the size of the ovary, tender on pressure, is found in the inguinal canal. Its connection with the uterus may be demonstrated by drawing the latter down with a volsella.

It requires to be diagnosed from an ordinary hernia, and from hydrocele of the round ligament.

TREATMENT.

Treatment.

A protecting shield may be worn; and where very troublesome, the ovaries may be cut down upon and removed. Reduction is usually impossible, owing to adhesions.

PROLAPSUS.

Prolapse of Ovary.

We have already considered the support of the ovary. Its attachments to the broad ligament, to its own special ovarian ligament, and to the ovarian fimbria of the Fallopian tube, assist, but its chief support is the infundibulo-pelvic ligament of the Fallopian tube; in addition, its own specific gravity has an influence in determining its level. Its position is constantly changing. As the bladder fills, it is displaced backwards, and its lower end rises; during pregnancy, it is drawn upwards out of its pelvic position and somewhat enlarged. The ovary is thus an organ liable to displacement, of which the most important is the *downward* one—known as *prolapse of the ovary.*

PATHOLOGICAL ANATOMY.

Pathological Anatomy.

The ovary lies lower than usual, in the lateral or in the true pouch of Douglas; the uterus may be in its normal position, but oftener it is retroverted. The ovary is usually enlarged, and often fixed by peritonitic adhesions.

Mundé considers the varieties of prolapsus as—

(1.) Retro-lateral, in the lateral pouch of Douglas;
(2.) Retro-uterine, in the true pouch of Douglas;
(3.) Ante-uterine, in the utero-vesical pouch, very rare;
(4.) In the infundibulum of an inverted uterus.

ETIOLOGY.

Etiology. The conditions present in the puerperium favour displacement of the ovary for two reasons; the normal ascent of the uterus during pregnancy may stretch the ovarian and infundibulo-pelvic ligaments, and the ovary may not return to its normal size after parturition. Simple congestion of the organ may cause it to descend; and it is alleged that sudden jolts may also drive it below its normal site. It is not quite certain whether the congestion is cause or result. Probably it is the cause; but it is also aggravated by the displacement.

SYMPTOMS.

Symptoms. These are radiating pains, pain on defæcation and coitus, a dragging sensation, reflex nervous symptoms with general irritability.

PHYSICAL SIGNS.

Physical Signs. Bimanually, we feel in the true or in the lateral pouch of Douglas a small body or bodies, exquisitely tender and lying distinct from the uterus. By the rectal examination, the ovary is felt with unusual distinctness. Great care must be taken to be gentle in examination. Cystic small ovaries are often adherent, the adhesion being probably caused by rupture of the cysts which may be done by even gentle manipulation and cause aggravation of symptoms and fresh adhesions.

TREATMENT.

Treatment. Blisters over the iliac region, hot vaginal douche, and bromide of potassium in fifteen-grain doses thrice daily. The bowels are to be opened by means of saline purgatives, such as the Friedrichshall water or Carlsbad salts. The following mixture is good :—

℞. Magnesiæ Sulphatis	ʒvj.
Quininæ Sulphatis	gr. xxiv.
Acidi Sulph. dil.	ʒiij.
Tincturæ Capsici	ʒj.
Aquam ad	℥vj.

Sig. Tablespoonful thrice daily.

This relieves the congestion by unloading the bowels.

A course of treatment at Kreuznach or other German Spa is often of service.

Often the prolapsed and non-fixed organ becomes, after a week of this treatment, distinctly higher in position. The glycerine plug or dry tampon is then of the utmost value.

In the chronic stage, when the uterus is retroverted and not fixed, the ring or the Albert Smith pessary is good (*v.* Retroversion of Uterus).

The cases where the tender ovaries are fixed low down by adhesions are exceedingly difficult to treat. When the uterus is retroverted and fixed and the ovaries below it, we get one of the most troublesome cases possible. Palliative treatment by blisters and the hot douche is best; if the case is not amenable to this treatment and the patient's general health is suffering, the propriety of Battey's operation should be considered.

Prolapse of the ovaries and their fixation are contra-indications to treatment indicated otherwise—such as Emmet's operation.

CHAPTER XXI.

OPERATIONS FOR REMOVAL OF FALLOPIAN TUBES AND OVARIES.

In this chapter we have to consider two operations: "Removal of the uterine appendages," in which both Fallopian tubes and ovaries are taken away; and "Oöphorectomy," in which the ovaries alone are removed. The latter operation was the earlier of the two and will therefore be considered first.

History of Operations.

The real history of these operations dates from August 17th, 1872, when Battey of Rome, Georgia, U.S.A., successfully removed the ovaries of a patient who suffered from intolerable dysmenorrhœa. On July 27th of the same year, Hegar of Freiburg had removed both ovaries in a case of severe ovarian neuralgia: the patient died, and Hegar did not publish an account of the case. Lawson Tait removed the ovaries for pain in October 1871, and for menorrhagia, on August 1st, 1872, both successfully. Blundell of London (1823), with that rare medical insight and experimental knowledge which led him to advocate—if not to practise—what recent obstetric science has shown to be a valuable mode of performing the Cæsarean Section, had already thrown out the suggestion that the ovaries should be removed in dysmenorrhœa and to arrest hæmorrhage in inverted uterus. To Battey, however, is due the honour not only of conceiving the idea, but—what was more difficult—of successfully carrying it into execution and impressing the profession with its importance and value in special cases. The same honour is due to Tait, with regard to his operation for removing the uterine appendages.

OÖPHORECTOMY (BATTEY'S OPERATION).

LITERATURE.

The literature on this operation is too extensive to be given in detail in a student's manual. The best summaries of cases are by Engelmann, Hegar, and Simpson. See also Index of Recent Gynecological Literature in the Appendix. *Battey*—Battey's Operation: Transactions of International Medical Congress, Lond., 1881. See Am. J. of Obst., October 1881, for discussion. See also *Battey's Operation:* American System of Gynecology edited by Mann, Vol. II., p. 837. *Byford*—Removal of the Uterine Appendages, etc., by Vaginal Section: Am. Journ. of Obstet., 1888, pp. 337 and 872. *Engelmann*—The Difficulties and Dangers of Battey's Operation: Am. Med. Asso. Trans., 1878 (date of reprint). Battey's Operation, 3 fatal cases: Am. J. of Obst., July 1878. *Hegar*—Die Castration der Frauen: Volkmann's Sammlung, Nos. 136-138. *Simpson, A. R.*—History of a Case of Double Oöphorectomy or Battey's Operation: Br. Med. J., May 24th, 1879. *Sims, J. Marion*—Remarks on Battey's Operation: Br. Med. Journal, 1877.

NOMENCLATURE.

Nomenclature.

We have adopted the term Oöphorectomy as a convenient and useful one. Other terms, however, have been proposed. Marion Sims suggested that it should be called Battey's Operation after its originator, and this name has been widely adopted. "Normal Ovariotomy" is a misnomer, inasmuch as the ovaries are not normal. "Spaying," a term advocated by Goodell, does not recommend itself by its delicacy. "Die Castration der Frauen," the German name for the operation, is open to a similar objection.

NATURE AND AIMS OF OPERATION.

Nature and Aims.

Oöphorectomy is the removal of diseased ovaries not enlarged by tumour-growth but causing serious symptoms such as menorrhagia, epilepsy, severe pain. Battey proposed it for dysmenorrhœa, on the theory that it would bring on the menopause prematurely. This, however, does not occur as an immediate result. More recently, Battey has declared that he operates to arrest ovulation.

INDICATIONS FOR OPERATION AND ITS RESULTS.

Indications.

These are not as yet strictly determined; *i.e.*, so far as our present knowledge goes, the operation is indicated in certain conditions, but as yet we do not know whether in all of them it produces the anticipated effect. They are as follows:—

(1.) Intolerable Dysmenorrhœa;
(2.) Bleeding from Fibroid Tumours, uncontrollable by other means;
(3.) Hystero-epilepsy, convulsions and threatened insanity, dependent on ovarian irritation or presence of ovaries with absence of uterus;
(4.) Prolapsed and fixed ovaries.

(1.) *Dysmenorrhœa.*—In those cases where the patient has intolerable and prolonged pain every month, wearing her down and rendering habitual recourse to opiates necessary, the operation may be performed. It should not be forgotten that the results in such cases are not so brilliant as was once expected. The menstruation is not at first entirely arrested by the removal of the ovaries; and, as we have always in such cases pelvic peritonitis adding to the patient's misery and untouched by the operation, it is evident that we must not expect too much from it. Lawson Tait believes that the Fallopian tubes must also be removed in order to arrest menstruation completely.

(2.) *Bleeding from fibroid tumours, uncontrollable by other means.*—It is in this condition, for which Battey's operation was first advocated by

Trenholm and Hegar, that the most brilliant successes have been won. Not only has hæmorrhage been checked, but the tumours themselves have diminished in size and even in some cases disappeared.

(3.) In some cases of *hystero-epilepsy, convulsions, insanity, and dancing mania*, dependent on ovarian irritation, the operation has been performed with but moderate success. Engelmann, Gilmore, A. R. Simpson, and Battey, quote some remarkable cases.

(4.) In cases of *ovaries prolapsed or fixed by adhesions*, and giving rise to intolerable pain in coitus or seriously affecting the patient's health, their removal is called for.

At the London International Congress the operation was discussed. According to Battey, the mortality has been 22 per cent. for incomplete operations, and 9½ per cent. for complete; for the complete operations, the results as to relief have been—

	No.	Per Cent.
Cured, ...	68	77
Greatly benefitted, . . .	15	17
Not benefitted, - . .	7	8

Of the incomplete operations—

	No.	Per Cent.
Cured, ...	3	18
Greatly benefitted, . . .	7	41
Not benefitted, . . .	7	41

Battey's statistics (1888) in private practice have been as follows: Fifty-four cases—cured 33, much improved 8, little improved 5, not improved 8. Complete menopause followed in 50 and pseudo-menstruation in 4.

METHOD OF PERFORMING THE OPERATION.

Operation. The ovaries may be removed (1.) *by the vaginal method*, or (2.) *by abdominal section.* As the former is the less usual method, we shall describe it but shortly.

Vaginal Method. (1.) *The vaginal method.* Give chloroform. Place the patient semiprone or, better, in the lithotomy posture. Pass Battey's speculum, lay hold of cervix uteri with a volsella and draw it down. Wash out the vagina thoroughly with a douche.

Now incise the posterior vaginal wall, behind the cervix, in the middle line for about an inch and a half. Open into the peritoneal cavity, pass in the index finger or long polypus forceps, and hook down the nearer ovary; supra-pubic pressure is made by an assistant. Ligature the ovary at the hilum with thin carbolized silk threaded on a fixed needle. The hilum is transfixed mesially with the needle, the double ligature drawn through and cut, one thread is tied round the one-half of the base and the other round the other half; the ovary is then cut off, and the ligature cut short. The other ovary is treated in the same way; we make certain that there is not a third ovary which would likewise require to be ligatured. Battey passes a temporary ligature round the base of tho ovary and then uses the écraseur. Lastly, pass in a drainage tube, stitch the wound (Battey leaves it unstitched), and irrigate twice daily with weak carbolic solution (1-100). After-treatment as in ovariotomy (*v.* Chap. XXIV.).

This method may be used if the ovaries are low down. It is sometimes difficult to make out the ovary, and even impossible to remove it. In one case Battey had to dig out portions with his finger nail; all was not removed, and the patient conceived some time afterwards.

Abdominal Section.

(2.) *Removal of Ovaries by Abdominal Section.* The abdominal walls are incised and the peritoneal cavity opened into as described in the Chapter on Abdominal Section in the Appendix. The fingers are passed in so as to touch the fundus uteri; and then carried along the Fallopian tube so as to recognise the ovary usually lying behind. It should be lifted up if possible to the incision, and ligatured with thin carbolised silk as described under the vaginal method; the ligatures are cut short and each side of the pedicle held with Péan's forceps. Marion Sims recommends his uterine repositor as an aid to the elevation of the ovaries. This elevation, however, can be more easily managed by introducing the two fingers or whole hand into the vagina, and elevating all in front of the posterior vaginal wall.

A very good knot is that known as the Staffordshire Knot, introduced for this and similar cases by Lawson Tait. The hilum is tranfixed with a needle and silk ligature; the needle is then withdrawn and the loop on the distal side brought over the ovary and carried below one end of the thread; the two ends are then tied over the loop with an artery knot (*v.* fig. 123).

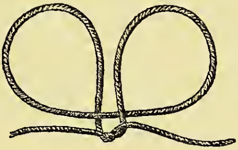


Fig. 123.

Staffordshire Knot (*Tait*).

This shows knot after loop has been brought over, one end brought above it, and the first turn of the artery knot made.

The ovary is then cut away with the knife at a point about half an inch clear of the ligature. The other ovary is treated in the same way. We hold the pedicle for a time in the Péan's forceps, before dropping it back, to see that there is no bleeding. The peritoneal cavity is cleansed and the abdominal incision closed as in any other case of abdominal section (*vide* Chapter on Abdominal Section in the Appendix).

The operation is by no means always an easy one. The skin incision is more difficult than in ovariotomy, for there is always a risk of wounding intestine. In some cases, Hegar has made a lateral incision. Sometimes, especially in cases of fibroids, it is exceedingly difficult to get at the ovaries. Engelmann has more particularly directed attention to this point. In one of his cases he says:—The ovaries were so deeply imbedded within the folds of the broad ligaments, and with them so firmly tied down to the sides and floor of the pelvis that it was impossible to move them. With the greatest difficulty several unsatisfactory ligatures were placed about the left ovary; but it was useless even to attempt to tie the right, so intimately was it blended with the broad ligament, and so immovably adherent to the pelvic walls. . . . I enlarged the incision to two inches above the navel, removed the intestine from the pelvic cavity, and then succeeded in enclosing the entire mass in the ligature, and removing the ovaries complete." Kaltenbach in one case ruptured the Fallopian tube dilated with pus; the patient died of septic peritonitis. Freund, Martin, Sims, and Battey have also recorded difficult cases.

GENERAL CONCLUSIONS.

Conclusions.

Agnew in his works on Surgery gives a list of 171 cases of oöphorectomy (up to 1886) with 18·72 per cent. deaths. Of these, 144 were performed by abdominal section and 27 by the vaginal method—with about equal mortality. The most brilliant results are in fibroids: those in dysmenorrhœa and nervous conditions are doubtful.

Some interesting physiological points have been brought out: removal of the ovaries does not bring on the menopause, sexual appetite is not diminished, and no womanly attributes are in any way removed. The outcry that it unsexes a woman is absurd. The ovaries removed were probably useless for procreation; and when their presence is causing *serious* illness, they are better removed.

REMOVAL OF UTERINE APPENDAGES (TAIT'S OPERATION).

LITERATURE. *Bertram*—Laparotomie bei Tumoren der Tuba Fallopii: Berliner Klinische Wochenschrift, Jany. 22, 1883. *Savage*—Diseases of the Fallopian Tubes: Birm. Med. Rev., Jan. 1883. *Tait, Lawson*—The Diagnosis and Treatment of Chronic Inflammation of the Ovary: Br. Med. Jour., July 29, 1882. An Account of 208 consecutive cases of Abdominal Section performed between Nov. 1, 1881, and Dec. 31, 1882: Br. Med. Jour., Feb. 17, 1883. Recent Advances in Abdominal Surgery: Int. Med. Cong. Tr., Lond., Vol. II., p. 228. The Modern Treatment of Uterine Myoma: Brit. Med. Journal, August 15, 1885. Removal of Uterine Appendages for the Arrest of Uterine Hæmorrhage: Am. Journal of Med. Science, 1882. *Thomas, T. G.*—A Contribution to the Subject of the Removal of the Uterine Appendages (Tait's Operation) for Prolonged Menstrual Troubles with Recurrent Pelvic Inflammations: N. Y. Med. Jour., Jan. 13, 1883. See also Index of Recent Gynecological Literature in Appendix for numerous papers giving latest results of various operators.

Removal of Uterine Appendages.

We have already seen that Battey's idea of bringing on a premature menopause by removal of the ovaries has not been found to be correct although this in no way detracts from the great honour due to his courage.

Lawson Tait believes that removal of the Uterine Appendages will arrest menstruation, and that therefore in certain cases of bleeding Fibroids we have a sure and safe means of controlling hæmorrhages and causing atrophy of the tumour. Chronic ovaritis and menstrual epilepsy are also indications although the results as to cure are less satisfactory in the latter. Recently, Johnstone of Danville, Kentucky, has asserted that to arrest menstruation it is necessary to cut a comparatively large nerve trunk which runs in the broad ligament up to the angle formed by the uterus and the uterine end of the Fallopian tube.

Lawson Tait, as we have seen, removes the appendages in cases of chronic ovaritis, pyosalpinx and hydrosalpinx. In these cases, however, the tubes are removed because atrophied or purulent; and the ovaries are removed too, inasmuch as besides being often diseased they are of course useless without the tubes. In the case of Fibroids, the appendages are removed not because diseased in themselves but to check bleeding. How they do this is not yet known. It is not by cutting off the blood supply, as the ovarian artery is not removed; and even if it were, the uterine artery is sufficient to carry on the circulation.

For the details of the operation, the student is referred to the chapter on Pyosalpinx, and to Abdominal Section in the Appendix.

CHAPTER XXII.

THE PATHOLOGY OF TUMOURS OF THE OVARY, PAROVARIUM, AND BROAD LIGAMENT.

LITERATURE.

Bantock—On the Pathology of certain (so-called) Unilocular Ovarian Tumours: Lond. Obst. Jour., Vol. I., p. 124. *Barnes*—Diseases of Women, p. 322. Lond. 1878. *Beck, Marcus*—Nephritis and Pyelitis subsequent to the affections of the lower urinary tract: Reynold's System of Medicine, Vol. V., 1879. *Coblenz*—Zur Genese und Entwickelung von Kystomen im Bereich der inneren weiblichen Sexualorgane: Virchow's Archiv. Bd. 84; ibid. Bd. 82. See also Ztschrift für Geburtshülfe und Gynäk., Bd. VII.; and Arch. für Gynäk., Bd. XVIII. *Coe*—Fibromata and Cystofibromata of the Ovary: Am. J. of Obst., XV., 561. *Cullingworth*—Fibroma of both Ovaries: Lond. Ob. Tr., XX., p. 276. *De Sinéty*—(v. Malassez). *Donat*—Ein Fall von sogenanntem Pseudomyxoma Peritonei: Archiv für Gynäk., Bd. XXVI. *Doran*—Clinical and Pathological Observations on Tumours of the Ovary, Fallopian Tube and Broad Ligament: London, 1884. (Also v. Harris.) *Drysdale*—On the Ovarian Cell found in Ovarian fluid: Trans. Americ. Med. Ass. (1873, date of reprint.) *Duplay*—Des Kystes du ligament large: Arch. Générales de Médecine, Oct. 1882. *Eichwald*—Colloidentartung der Eierstöcke: Wurz. Med. Z., B.V. 1864, p. 270. *Fischel*—Ueber Parovarialcysten und parovarielle Kystome: Arch. für Gynäk., Bd. XV. S. 198. *Foulis*—Cancer of the Ovary: Ed. Med. Jour., 1875, p. 838. The Diagnosis of Malignant Ovarian Tumours, and Malignant Peritonitis: Brit. Med. Jour., 1878, pp. 91 and 658. *Fox, Wilson*—On the Origin, Structure, and Mode of Development of the Cystic Tumours of the Ovary: Lond. Roy. Med. and Chir. Tr., Vol. XLVII., p. 227. *Gabbett*—Colloid Degeneration of the non-cystic Ovary, &c.: Journal of Anat. and Physiology, Vol. XVI. *Garrigues*—Diagnosis of Ovarian Cysts by means of the examination of the Contents: Am. J. of Obst., XV., p. 1. *Gusserow*—Ueber Cysten des breiten Mutterbandes: Archiv f. Gynäk., Bd. IX., S. 478. *Harris and Doran*—The Ovary in Incipient Cystic Disease: Jour. of Anat. and Physiol., Vol. XV., Pt. IV., July 1881. *Howell, S. Y.*—Pathology of Ovarian Tumours: Amer. Syst. of Gynec. and Obst., Vol. II., p. 950. *Killian*—Zur Anatomie der Parovarialcysten: Arch. für Gynäk., XXVI., S. 460. *Malassez et De Sinéty*—Sur la Structure, l'Origine et le Developement des Kystes de l'Ovaire: Archiv. de Physiologie Normale et Pathologique, Vol. V., 1878, p. 343. *Nœggerath*—The Diseases of Blood-vessels of the Ovary in Relation to the Genesis of Ovarian Cysts: Am. Jour. of Obst., Vol. XIII., 1880. *Olshausen*—Die Krankheiten der Ovarien: Billroth's Handbuch: Stuttgart. *Patenko*—Ueber die Entwickelung der Corpora Fibrosa in Ovarien: Virchow's Archiv, Bd. 84, 1881. *Rindfleisch*—Pathological Histology, New Sydenham Society Translation, 1873, p. 171. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1879. *Slavjansky*—Zur normalen und pathologischen Histologie des Graaf'schen Bläschens des Menschen: Virchow's Archiv, Bd. 51, 1870. *Sutton, J. Bland*—An introduction to General Pathology: J. & A. Churchill, London, 1886. *Tait*—Diseases of the Ovaries: Cornish, Birmingham, 1883. *V. Swiecicki*—Zur Casuistik des Pseudomyxoma

Peritonei (Werth): Cent. für Gynäk., No. 44, 1885. *Waldeyer*—Die Eierstockscystome: Archiv f. Gynäk., Bd. 1, S. 252. *Wells, Sir T. S.*—Ovarian and Uterine Tumours: Churchill, London, 1882. *Werth*—Ueber Pseudomyxoma Peritonei: Arch. für Gynäk., Bd. XXIV. *Williams*—Ovarian Tumours; Reynold's System of Medicine, Vol. V. Olshausen, Schroeder, and Williams give the literature well. Coe's and Cullingworth's articles give the literature for solid tumours. *See* also Index of Recent Gynecological Literature in the Appendix.

Origin of Ovarian Cysts.

THE somewhat complex subject of Ovarian Tumours will be best considered under the following heads:—

1. *Preliminaries;*
2. *The mode of origin of ovarian cysts;*
3. *Varieties of ovarian cysts, their naked-eye and microscopic anatomy;*
4. *The nature of ovarian fluids;*
5. *Solid ovarian tumours, malignant tumours and the nature of the ascitic fluid associated with them.*

PRELIMINARIES.

We must first consider some points in relation to the development of the fœtus, and the anatomy and physiology of the ovary and adjacent structures. These we take up under the following divisions:—

(1.) Development of the genito-urinary organs;
(2.) Anatomy of the ovary;
(3.) Physiology of the ovary.

Development of genito-urinary organs.

(1.) *Development of the genito-urinary organs.* In the human fœtus there are two structures from which the future urinary and sexual organs are to be developed: these are the ducts of Müller and the Wolffian bodies (fig. 1, Pl. XI.). In the female, the *ducts of Müller* form the Fallopian tubes, uterus and vagina; the *Wolffian bodies* do not develop but traces are found normally in the broad ligament forming the parovarium, while we may have further traces in the positions shown in fig. 122, as well as in the hilum of the ovary.

It is from these remnants of the Wolffian bodies that the following cystic tumours are developed; viz., papillomatous cysts of the hilum, parovarian cysts, cysts of the broad ligament, and what Coblenz terms para-uterine cysts.

Anatomy of Ovary.

(2.) *Anatomy of the ovary.* In regard to the anatomy of the ovary, we must note two great divisions of it: viz. the *Hilum* and *Parenchyma*—the former containing traces of the Wolffian bodies and the latter the characteristic structures known as the Graafian follicles with their ova (fig. 122). In regard to the development of these follicles, we have already seen that the actively growing connective tissue of the ovary encloses the germ epithelium; that certain of the germ epithelial cells thus enclosed develop into ova; while the connective tissue itself, according to Foulis, forms the membrana granulosa (*v.* Plate X., fig. F.). The germ epithelium thus *enclosed* gave rise to the erroneous idea that the developing ovary was a tubular organ; and to the epithelium thus enclosed (or rather, according to Pflüger, the epithelium penetrating into the ovarian stroma) was given the name of Pflüger's ducts.

A section of a developed ovary shows, further, *cellular structures* (fig. 124), which (according to Waldeyer) are some of Pflüger's ducts that have not developed as they should have done into Graafian follicles, and which may give origin to ovarian cysts.

It must also be remembered that we have in the ovary a great variety of tissue, viz., fibrous and spindle-celled connective tissue, and unstriped muscle.

Physiology of Ovary.

(3.) *Physiology of the Ovary.*—When we consider that every month between puberty and the menopause a Graafian follicle distends and then ruptures, we are led to expect what really does sometimes occur, viz., that the follicle may not rupture but merely distend to form a pathological cyst. When pregnancy occurs, the ruptured follicle has its large corpus luteum filling it; and in this also we may have pathological development. Of the 30,000 to 75,000 Graafian follicles contained in each ovary, only an insignificant number develop and rupture at each menstrual period. Many of the rest atrophy, forming the corpora fibrosa which are seen on section as fibrous points and contain no vessels; it is alleged that these corpora fibrosa may originate also from ripe follicles or from follicles where there has been hæmorrhage.

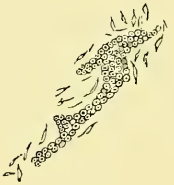


FIG. 124.

CELLULAR BODIES alleged by Waldeyer to be enclosed germ epithelium which has not developed into normal Graafian follicles. He believes these to be one source of ovarian tumours (*Nœggerath*).

MODE OF ORIGIN OF OVARIAN CYSTS.

Mode of Origin of Ovarian Cysts.

Ovarian tumours may arise from the following sources:—

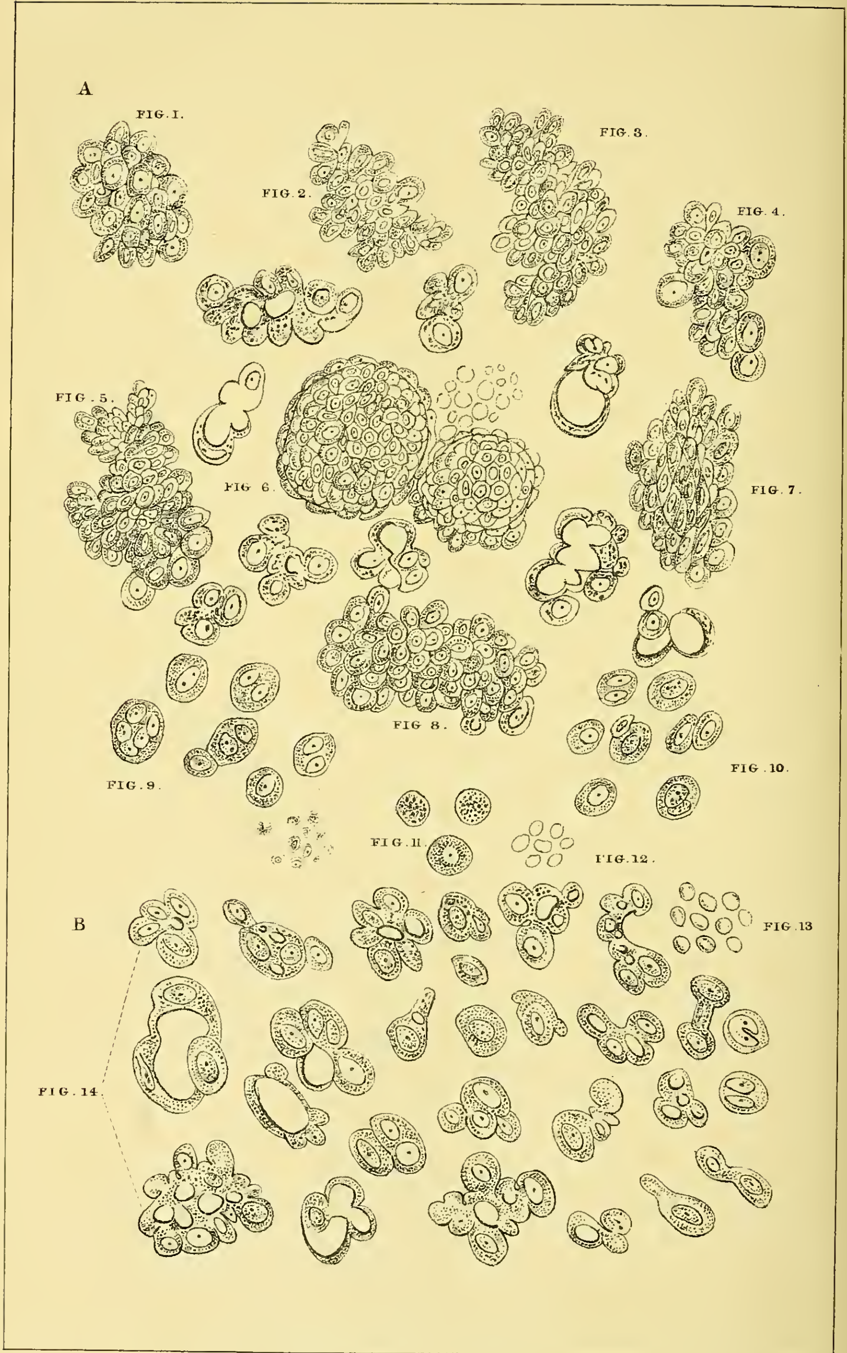
(1.) Distention and coalescence of Graafian follicles;

(2.) Degeneration of undeveloped Graafian follicles (ordinary multilocular tumours);

(3.) Development of remnants of the Wolffian bodies in the hilum of the ovary (papillomatous tumours);

(4.) Malignant development of the connective tissue of the ovary.

PLATE IX.



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There are other alleged sources for which the evidence is not as yet sufficient: viz.,

(5.) Degeneration of blood-vessels;
(6.) Certain epithelial tubes running into the ovary;
(7). Colloid degeneration of ovarian stroma.

Wilson Fox's view.

(1.) *Distention and coalescence of Graafian follicles.*—There can be no doubt that small cysts may so originate. The proof of this is positive, as Rokitansky found ova in cysts about the size of a bean. Wilson Fox has attempted to show, in his well-known paper, that all the varieties of cystic tumours may be formed in this way.

(2.) *Degeneration of undeveloped Graafian follicles* (*ordinary multilocular tumours*).—This is probably an important source for the ordinary multilocular tumours. The normal atrophic changes in the youngest or primordial follicles have been traced by Slavjansky and Patenko, whose researches are too detailed for quotation here. Changes in the normal retrogression of these, viz. active ingrowth of the ovarian stroma and breaking down of the relics of the membrana propria of the follicle are probably important in bringing about the cystic changes.

(3.) *Development of remnants of the Wolffian bodies in the hilum of the ovary* (*papillomatous tumours*).—As already mentioned when speaking of the development of the genito-urinary system (*v.* p. 199), remains of the Wolffian bodies persist at the hilum of the ovary. Coblenz believes that when ovarian tumours show a *papillomatous* development, they have arisen from this portion of the ovary.

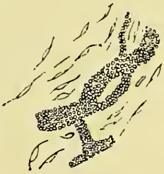


FIG. 125.
CELLULAR BODIES which Nœggerath believes to be diseased blood-vessels and not germ epithelium as Waldeyer asserts (*Nœggerath*).

(4.) *Malignant development of connective tissue of ovary.*—In malignant disease of the ovary, ascitic fluid is often formed in which are characteristic cells first described by Foulis of Edinburgh. Plates IX. and X. show these. They will be considered under the ascitic fluid associated with malignant tumours. Foulis' developmental work on the ovary has valuable bearings on its pathology.

Nœggerath's view.

(5.) (6.) (7.) *Degeneration of blood-vessels; certain epithelial tubes running into the ovary; colloid degeneration of ovarian stroma.*—Nœggerath of New York first pointed out that *diseased blood-vessels* might form a source of ovarian cysts. According to him (fig. 125), we have disease of the intima of the vessel, loss of its endothelium, and percolation of the contents of the vessel into the intima. Migrating cells accumulate in the interstices of the intima and break it up. The large granular nucleated cells found in ovarian cysts are, according to him, these lymph corpuscles. Nœggerath considers that the cellular structures, which other observers hold to be Pflüger's ducts, are diseased vessels. De Sinéty and Malassez first described certain *epithelial tubes* (fig. 126) from which ovarian tumours develop; these are not true Pflüger's ducts, but differ from them in being hollow and having no ovum. They consider them as Pflüger's ducts which have taken on a low type of development. *Colloid degeneration of the ovarian stroma* (fig. 127) has been said by Rindfleisch to produce an ovarian tumour.

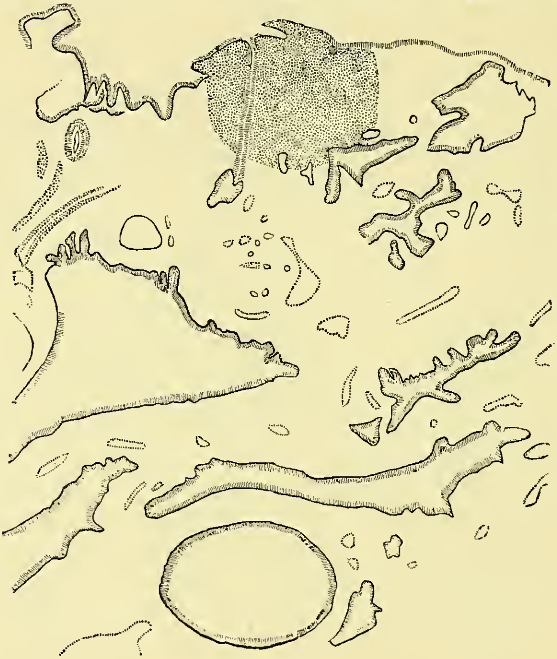


FIG. 126.

SECTION OF OVARY showing an epithelial tube (at the shaded part of the section). Lower down are seen spaces of varying size, and lined with a single layer of epithelium; these cysts are developed from the epithelial tubes. The connective tissue basis is shown only at the shaded part of section (*De Sinéty*). ($\frac{25}{1}$)

View of De Sinéty and Malassez.

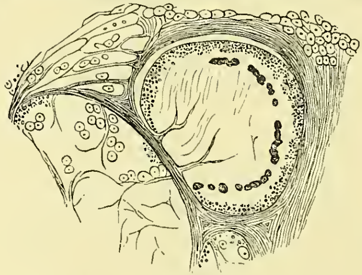


FIG. 127.

COLLOID DEGENERATION of OVARIAN STROMA (*Rindfleisch*).

Variance of Opinion.

The student will therefore see that the cellular structures found on section of ovaries, although considered by all as a source of origin for ovarian cysts, have their nature disputed. Nœggerath believes them to be diseased blood-vessels; Waldeyer, Spiegelberg, Schroeder and others think them to be Pflüger's ducts, while Doran considers them to be undeveloped Graafian follicles; De Sinéty and Malassez hold that they are Pflüger's ducts degraded in development; they are likely in some cases Wolffian remnants. The most probable sources are undeveloped Graafian follicles and relics of Wolffian bodies.

VARIETIES OF OVARIAN CYSTS; THEIR NAKED-EYE AND MICROSCOPIC ANATOMY.

Varieties of Ovarian Cysts.

(1.) Hydrops folliculorum;
(2.) Cystoma ovarii—
  a. Cystoma ovarii proliferum glandulare (arising in the parenchyma of the ovary),

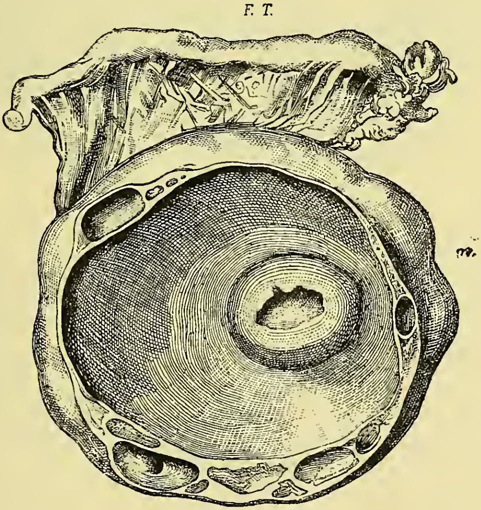


Fig. 128.
A Small Multilocular Ovarian Cyst, slightly reduced from natural size (Museum of the Royal College of Surgeons, Pathological Series, No. 275) (*Doran*).

  b. Cystoma ovarii proliferum papillare (arising in the hilum of the ovary),
  c. Combination of *a* and *b*;
(3.) Dermoid cysts;
(4.) Cystoma malignum.

Naked-eye Anatomy.

Naked-eye Anatomy.—An ordinary multilocular ovarian tumour is best described as made up of two parts—the cyst and its pedicle.

The cyst is always multiple (fig. 128); and the pedicle is usually made up of ovarian ligament, Fallopian tube and broad ligament. In the case of the papillomatous form (developing from the hilum) of ovarian tumour (fig. 129, and Pl. XI. fig. 5), we may still recognise the ovary, as such, continuous with the tumour; but in the ordinary multilocular form, this cannot be done. In the multilocular form, on section, many cavities are found with glairy or semisolid contents. In cysts of the hilum we have the papillomatous condition seen at fig. 130, where the papillomata are fine tag-like projections and the fluid usually watery. In the multilocular cysts we may have papillary masses sprouting and coalescing. Occasionally, though very rarely, the

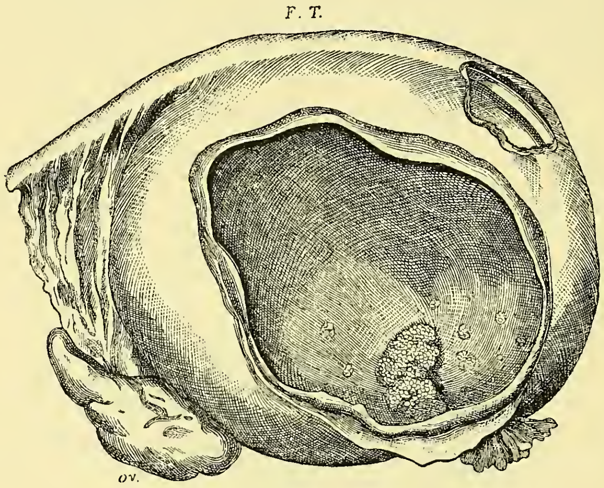


FIG. 129.

A LARGE PAPILLOMATOUS CYST springing from the Hilum of the Ovary, the greater part of which organ is not involved in the morbid growth. The cyst has forced its way between the layers of the broad ligament as far as the Fallopian tube; this condition has been made more clear by removal of a part of the ligament over the tube and another part over the cyst; the corresponding portion of the wall of the cyst has also been taken away to expose the cavity (*Doran*).

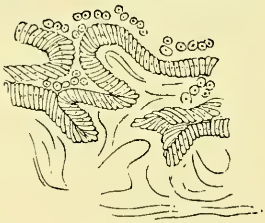


FIG. 130.

SECTION THROUGH CYST WALL, showing papillæ covered with columnar epithelium, and sub-epithelial layer of connective tissue (*Rindfleisch*). $(\frac{200}{1})$

multilocular tumour is not formed of coalesced tumours but is grape-like—Rokitansky's tumour. Tait figures a specimen in his work on Diseases of the Ovary; Winckel and Olshausen record similar cases.

Microscopical Anatomy.

Microscopical Anatomy.—Externally the cystic tumour is covered with cubical or flat cells, not with peritoneum. Beneath this we have fibrous tissue in lamellæ, while most internally there is the cyst wall with an endothelial or columnar cell-lining. In the papillomatous tumours, the projections are covered with cylindrical epithelium, often ciliated, with a core of connective tissue and blood-vessels (fig. 130).

In some cases of ruptured ovarian cyst it has been pointed out by Werth that, in addition to the presence of the gelatinous cyst-contents among the abdominal viscera, we may get a special condition of the peritoneum set up to which he gives the name *Pseudomyxoma Peritonei.* In one case microscopic examination of the altered peritoneum showed small-celled infiltration, and extension of blood-vessels as a network through the gelatinous layer so that the latter came to lie in spaces.

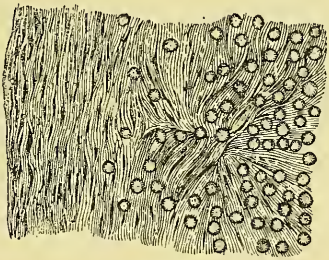


FIG. 131.

ROUND-CELLED SARCOMA FROM A DERMOID CYST, showing the transition from the connective tissue of the firmer portion of the tumour to the collection of round cells, with a trace of fibrillation of the intercellular substance in the softer portion of the tumour (*Doran*).

Donat has also recorded a case operated on by Sänger, analogous to those recorded by Werth, where recovery took place. He urges with good reason that the so-called "Pseudomyxoma Peritonei" is simply peritonitis set up by the irritation of the effused cyst contents (Fremdkörper Peritonitis).

Dermoid Cysts.

Dermoid cysts are said to be due to abnormal inclusion of the epiblast, *i.e.*, are developmental in their origin. They have an outer fibrous coat and an inner one composed of true skin. They may contain hair, teeth, bone, striped muscle, nervous matter, cholesterine, and sebaceous matter. Doran draws attention to the fact that dermoid cysts may contain malignant new growths, notably sarcomata (fig. 131). When teeth are present, their crowns have been found to slope slightly towards the median plane of the body: in this way, the side of the body from which the tumour has arisen can be made out (Holländer: *v.* Olshausen).

The *Cystoma malignum* is a cystic tumour which has undergone malignant degeneration. It is noteworthy that malignant disease often develops after the removal of an apparently simple tumour, notably after papillomatous tumours.

THE NATURE OF OVARIAN FLUID.

Ovarian Fluid.

Ovarian fluid varies much in consistence and colour. It is usually viscid, and may be so thick as to be almost gelatinous. Its colour is yellowish or greenish; and the specific gravity, when of the more fluid consistence, varies from 1010 to 1020. Chemically, the fluid is complex. The chemical composition has been investigated by Eichwald, whose paper may be consulted.

Ovarian fluid does not give a flocculent precipitate as ascitic fluid does.

The presence (in ascitic) or absence (in ovarian) of such a precipitate can be most easily determined by suspending, as Foulis has suggested, a soft cotton thread in a bottle containing the doubtful fluid; the thread can then be examined microscopically for the deposit which forms in its interstices.

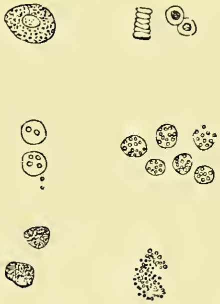


Fig. 132.

Some Cellular Elements of Ovarian Fluid. At the upper right hand corner we have red blood corpuscles. Below these lie the granular ovarian cells, and below them free granular matter. At the upper left hand corner is shown an epithelial cell; below it, a pus cell after addition of acetic acid; and below this, pus cells before addition of acetic acid. (*Drysdale*).

The corpuscular elements of ovarian fluids are various. There may be oil globules, cholesterine crystals, blood fresh or altered, with large granular cells.

Corpuscle of Bennett and Drysdale.

Hughes Bennett of Edinburgh and Drysdale of Philadelphia have described a corpuscle, seen at fig. 132, as characteristic of ovarian fluids. According to Drysdale it "is generally round, delicate, transparent, and contains a number of granules but no nucleus;" its size varies from $\frac{1}{5000}$ of an inch to $\frac{1}{2000}$ of an inch in diameter. Acetic acid added to pus makes the cells larger and brings nuclei into view; while it only increases the transparency of the ovarian cell and makes its granules more evident. Recently, Garrigues has investigated the microscopical nature of ovarian fluids in an able research. He believes Drysdale's cell and Bennett's corpuscle to be the nuclei of epithelial cells fattily degenerated, and that there are no pathognomonic ovarian cells.

SOLID OVARIAN TUMOURS; MALIGNANT TUMOURS AND THE NATURE OF THE ASCITIC FLUID ASSOCIATED WITH THEM.

Solid and Malignant Tumours.

Non-malignant (solid) tumours are rare. Myoma of the ovary (fig. 133) has been described by Doran; and Cullingworth has reported an interesting case of fibroma of both ovaries. A tubercular condition of the ovary is found as part of general tuberculosis.

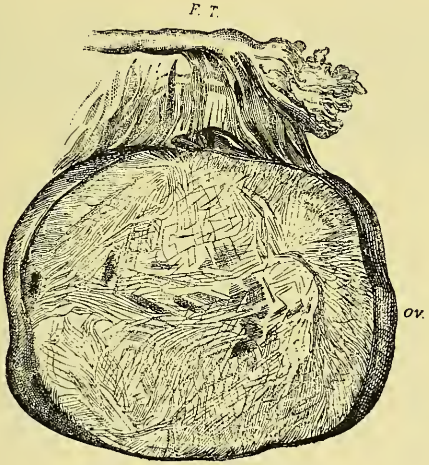


Fig. 133.
Myoma of the Ovary (*Doran*).

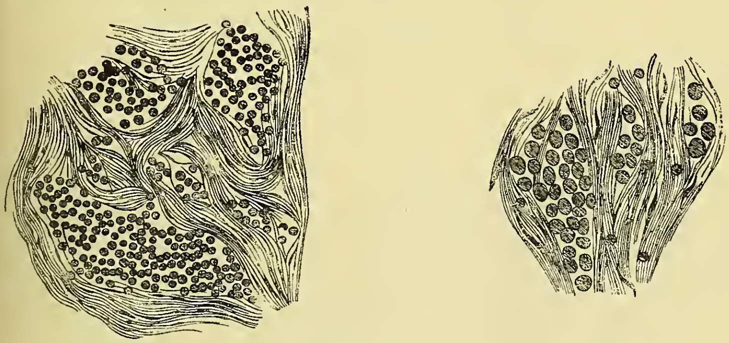


Fig. 134.
Cancer of the Ovary (2-inch and $\frac{1}{8}$-inch objectives) (*Doran*).

Malignant disease of the ovary is a comparatively frequent occurrence. It often complicates cystic degeneration, specially the papillary form of ovarian cyst. It arises also independently, and may occur either as primary Carcinoma or Sarcoma. Fig. 134 shows the character of the growth in a case of scirrhus of the ovary in a girl aged fifteen, described by Thornton and Doran.

Sarcoma may occur both in the spindle-celled and alveolar forms. The spindle-celled (fig. 135) forms a transition from the simple fibro-myomatous tumour to the alveolar sarcoma (fig. 136).

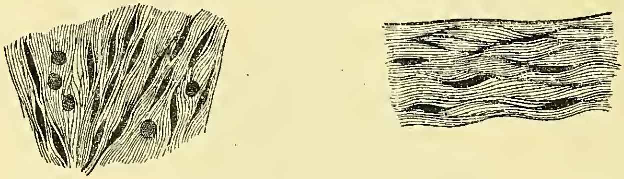


FIG. 135.
SPINDLE-CELLED SARCOMA OF THE OVARY, showing the superficial and the more central part of the tumour (*Doran*).

Foulis' Researches.

An important feature is the rapid development of ascites, without the existence of cardiac, hepatic, or renal disease to explain it. Of great importance are the cells in the ascitic fluid associated with malignant ovarian disease. Foulis has investigated this subject, and has brought out results of very great value. Through his kindness we have been able to reproduce in Plates IX. and X. the cells he has drawn attention to; and he has kindly furnished us with the following description.

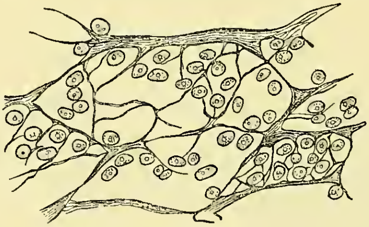


FIG. 136.
ALVEOLAR SARCOMA OF THE OVARY (*Doran*).

"*A*. Sprouting cell groups found in ascitic fluid surrounding a large cysto-sarcoma of the ovary.

For a history of this case see Edin. Med. Jour., 1875, p. 838.

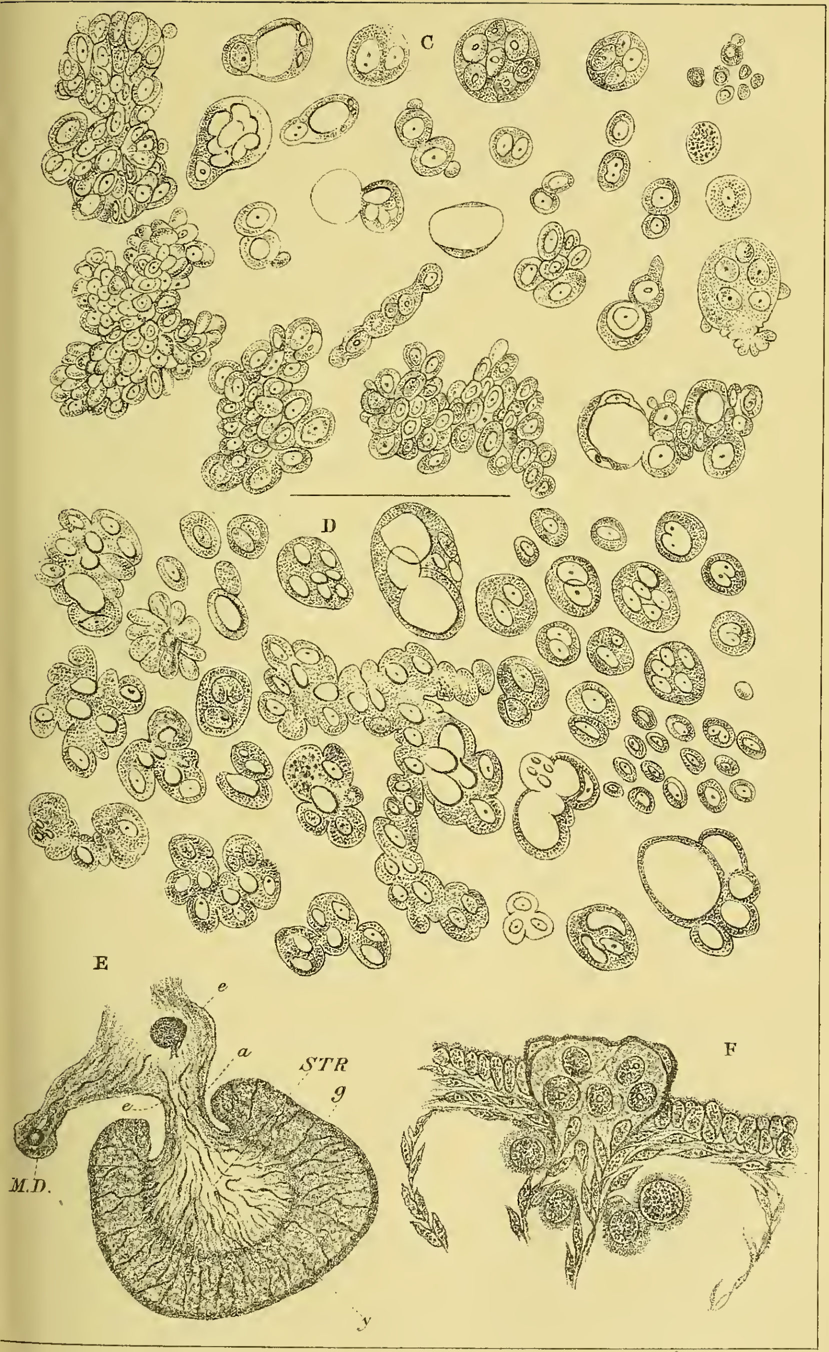
In figures 3, 4, 5, 7, great variation in form and size of the cells in each group is seen. The largest cells are generally seen at the margins of the groups.

Fig. 9. Several large polynucleated cells, evidently detached from cell groups.

Fig. 11. Cells undergoing fatty degeneration.

Fig. 12. Blood corpuscles.

PLATE X.



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"*B.* Cell groups found in the deposit from ascitic fluid surrounding a large soft malignant tumour of the ovary. In many of the cell-masses, large vacuoles are seen.

"*C.* Cell groups found in the deposit from ascitic fluid surrounding a large flat or pancake-shaped tumour of the omentum. The tumour was thought to be ovarian. In the fluid in the pleural sacs exactly similar cells and cell groups were seen, and the pleural surface of the diaphragm was studded over with cancerous nodules.

"*D.* Cell groups found in ascitic fluid in the case of a gentleman, aged seventy, suffering from malignant peritonitis. In the centre a very large cell mass, with numerous vacuoles in the substance of the protoplasm, is seen.

All the cell groups and cells were drawn by the aid of the camera lucida under a power of 350 diameters, with No. 3 ocular."

It is probable that these liberated cells found in ascitic fluid graft themselves on the peritoneum, and pass through the diaphragm into the pleura and pericardium. They behave as we have seen bacteria do (*vide* p. 147).

To illustrate the development of the normal ovary and of the Graafian follicles, we have added the following figures from Foulis' paper on this subject.

Plate X.—"*E.* Section through ovary and Wolffian body of a fœtal lamb.

a stalk of ovary, *STR* stroma, *MD* duct of Müller, *e* epithelium of peritoneum, *g* germ epithelium, *y* deepest part of the parenchymatous zone of the ovary.

F. Connective tissue sprouting out and surrounding the germ epithelium."

PAROVARIAN CYSTS.

Parovarian Cysts.

These tumours are developed from the parovarium, have a separable peritoneal covering, are thin-walled, and contain a watery fluid which is little more than a mere solution of salt. They may contain papillomatous growths, however, owing to their Wolffian origin—an argument for their being always removed by abdominal section. Small parovarian tumours are common, but they may also be of very large size. They are seldom lined by ciliated epithelium, but usually by cubical or squamous cells, the flattening being, according to Spiegelberg, due to pressure of contents.

It must be remembered of course that all cysts of the broad ligament are not parovarian in their origin. Parovarian cysts are in the site of the parovarium, with the ampullary portion of the tube and the ovarian fimbria stretched and the ovary intact.

OTHER BROAD LIGAMENT CYSTS (PAROVARIAL CYSTS).

Parovarial Cysts.

By these we mean cysts developed in the broad ligament but not from the ovary or parovarium. They are however identical in origin with Parovarian cysts, as they arise from Wolffian relics; further, they may be papillomatous.

The direction of development of these tumours is of great practical interest as they may spread within the folds of the ligament towards the side of the pelvis, towards the uterus, or down in the direction of Douglas' pouch. This renders their removal troublesome as they have then to be enucleated, owing to the absence of a pedicle (*v.* Plate XI.).

These cysts may rupture and cause infective papillomatous growths of peritoneum and ovary.

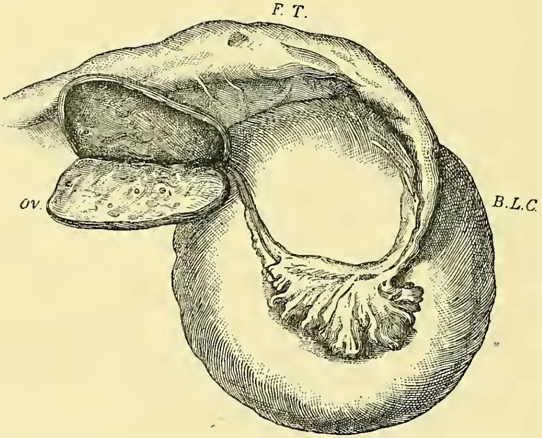

FIG. 137.

A SIMPLE BROAD LIGAMENT CYST (*Doran*).
Ov. Ovary split open; *F.T.* Fallopian tube; *B.L.C.* Broad ligament cyst.

Plate XI. from Coblenz will be helpful to the student in enabling him to understand the genesis of ovarian tumours, and will also show him the value of a knowledge of development in clearing up the origin of disease.

Fig. 1 shows diagrammatically the development of the urinary and generative organs in the human fœtus—female organs (chiefly developed from the ducts of Müller while the Wolffian bodies are rudimentary) shown to the right of the line *m*, and male organs (chiefly developed from the Wolffian bodies while the ducts of Müller are rudimentary) to the left. The rudimentary organs are coloured blue in the figure. On *both* sides, we have *nn* supra-renal capsule, *n* kidney, *u* ureter, *v* bladder, *ua* urethra; to the *right* (female organs) are *O* ovary, *po* parovarium,

PLATE XI.

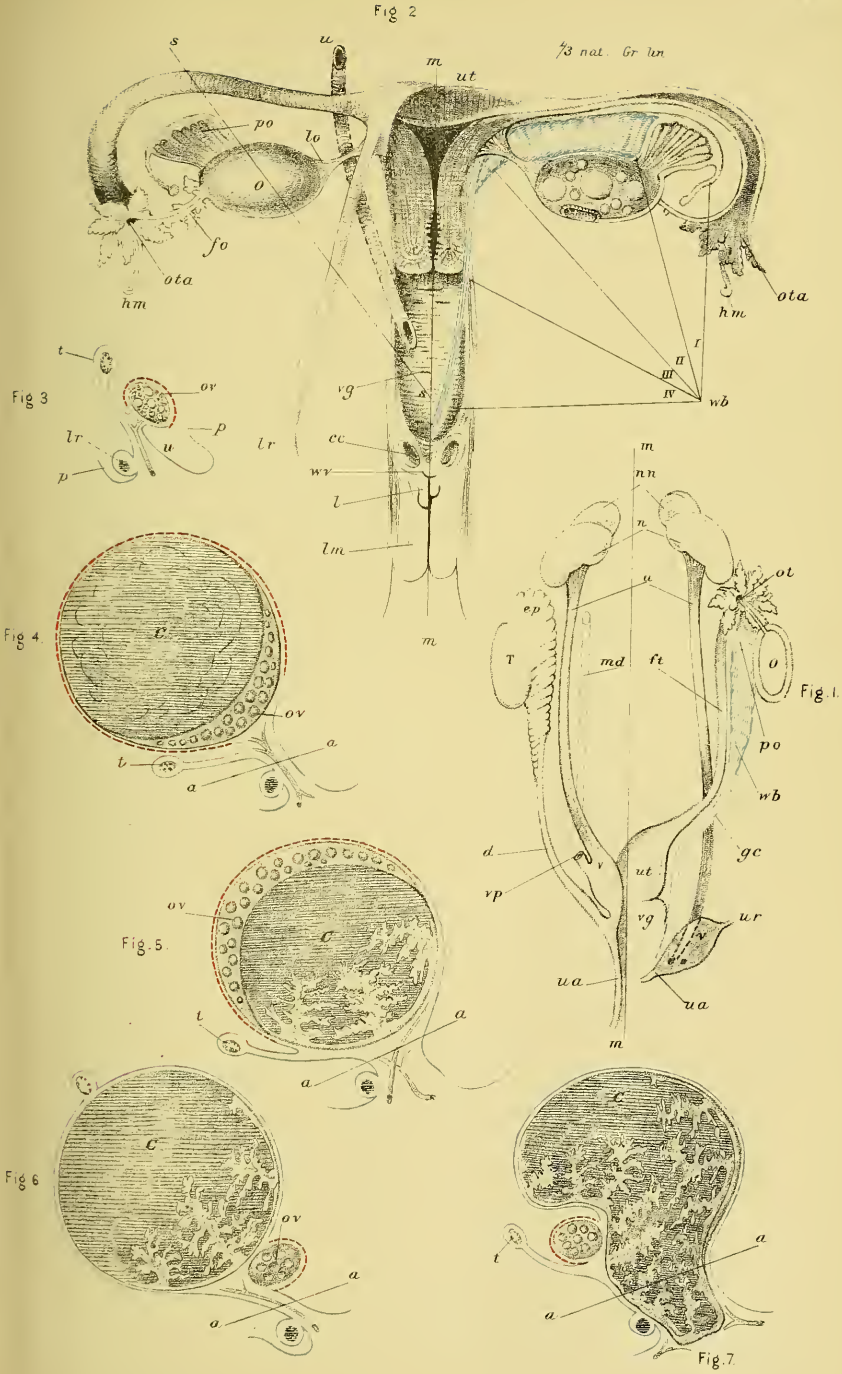

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DIAGRAM OF MODE OF ORIGIN AND GROWTH OF MULTILOCULAR AND PAPILLOMATOUS OVARIAN TUMOURS (Coblenz).

wb part of Wolffian body not forming parovarium, *gc* Wolffian duct persisting in Gärtner's canal, *ot* fimbriated end of tube, *ft* Fallopian tube, *ut* uterus, *vg* vagina, *ur* urachus; to the *left* (male organs) are *T* testis, *ep* epididymis, *vd* vas deferens, *md* duct of Müller rudimentary down to *vp* vesicula prostatica.

Fig. 2 shows the fully-developed generative organs in the female: on the left, the organs found in the normally developed female are given; while, on the right, the coloured portion shows the rudimentary structures from which there may be pathological development. On the left, the broad ligament is supposed to have been removed; on the right, the organs are shown in coronal section ($\frac{1}{3}$ nat. size); *ota* ostium tubæ abdominale, *hm* hydatis Morgagni, *fo* ovarian fimbria, *O* ovary, *lo* ovarian ligament, *po* parovarium, *lr* round ligament, *vg* vagina, *wv* upper wall of vestibule, *cc* corpus cavernosum clitoridis, *u* ureter, *l* labium minus, *lm* labium majus; *wb* Wolffian body in its special separate parts as follows:—

Segment I. parovarium, II. III. IV. normally obliterated parts of Wolffian body and duct. From II. we may get cysts of broad ligament developing as well as papillomatous ovarian ones. From the duct (III. and IV.), we may get cysts of cervix uteri and vagina.

Fig. 3 shows a section (in line *ss* Fig. 2) of broad ligament, Fallopian tube, and ovary. The blue line *pp* is the peritoneum, *u* being posterior layer of broad ligament; the red one, the germ epithelium of ovary; *t* tube, *ov* ovary, *lr* round ligament.

Fig. 4 shows development of ordinary multilocular tumour: *C* cystic and *o v* solid parts of tumour; *a a* line of section when tumour is removed; other letters as before.

Fig. 5 shows a tumour which is multilocular and papillomatous, the latter feature caused by Wolffian remains at hilum of ovary.

Fig. 6 shows papillomatous tumour of the parovarium developing in broad ligament, the ovary being intact.

Fig. 7 shows papillomatous cyst extending within the layers of broad ligament developed from remains of Wolffian body and pushing up posterior layer of broad ligament (cf. Fig. 3*u*).

The student will see by comparing Figs. 3, 4, 5, 6, and 7, how glandular and papillomatous cysts alter the relations of structures in the broad ligament. He will also understand the formation of the pedicle (*v.* figs. 4, 5, and 6), as well as the necessity for enucleation in such a case as Fig. 7.

RELATION OF EVOLUTION TO THE PATHOLOGY OF OVARIAN TUMOURS.

As we have seen, the undeveloped Graafian follicles are the most probable source of the multilocular ovarian tumour. From the remains of the Wolffian body known as the Parovarium the parovarian tumour develops: while from the less constant remains at the ovarian hilum and near the uterus, the infective papilloma arise.

It is remarkable that in the ovary of woman we should have not only so many thousands of unnecessary Graafian follicles formed, but that at an early period of intrauterine existence there should be in the fœtus structures from which both ovaries and testes are developed, and that, in the Wolffian relics already mentioned, the adult woman should have traces of what in the other sex developes into the male organs. At present, we know of no explanation of these facts unless on the evolution hypothesis. Whether this explanation will hold good it is impossible to say, but at present it appears that to structures which in her are rudimentary and functionless woman is mainly indebted for the serious risks of ovarian cysts, simple and malignant.

CHAPTER XXIII.

DIAGNOSIS OF OVARIAN TUMOURS.

LITERATURE.

Atlee, W. L.—The General and Differential Diagnosis of Ovarian Tumours: Lippincott and Co., Philadelphia, 1873. On Sarcoma of the Ovaries: Am. Gyn. Tr., Vol. II. *Barnes*—Diseases of Women, p. 400: London, 1878. *Brown, J. Baker*—Surgical Diseases of Women: London, 1866. *Duncan, J. Matthews*—Diseases of Women: London, Churchill, 1886. *Hicks, Braxton*—Further Remarks on the Use of Intermittent Contractions of the Pregnant Uterus as a means of Diagnosis: Lond. Inter. Congress Tr., 1882. Also Tr. of Lond. Obst. Soc., Vol. XIII., and Proc. of Royal Soc. of Lond., 1878. *Jastrebow*—On a point in the Diagnosis of Ovarian Tumours: Lond. Inter. Congress Tr., 1882. *Olshausen*—Die Krankheiten der Ovarien: Billroth's Handbuch, Stuttgart, 1877. *Ritchie, C. G.*—Contributions to Ovarian Physiology and Pathology: Churchhill, London, 1865. *Schroeder*—Handbuch der Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1879. *Tait, Lawson*—Diseases of the Ovary; Cornish, Birmingham, 1883. *Wells, Sir T. Spencer*—Ovarian and Uterine Tumours: London, 1882. *Williams, John*—Ovarian Tumours: Reynold's System of Medicine, Vol. V. Lectures on the Diagnosis and Surgical Treatment of Abdominal Tumours: Br. Med. Jour., 1878.

For convenience we take up the diagnosis and differential diagnosis of ovarian tumours under three heads:—

A. When small (pelvic in position);
B. When large, multilocular, and pediculated (chiefly abdominal in position);
C. When large and extraperitoneal (often papillomatous).

A. WHEN SMALL (PELVIC IN POSITION).

These may be either (*a.*) Lateral to uterus, or (*b.*) Posterior to uterus.

(*a.*) *Pelvic ovarian tumours lateral to Uterus.*

Diagnosis of Ovarian Tumours when pelvic and lateral to Uterus.

1. *Symptoms.*—These are chiefly those of pressure and bearing-down, and have no diagnostic value. There is no menorrhagia.

2. *Physical signs.*—Palpation and percussion give evidence of the presence of a tumour only when it projects much above the brim. Auscultation gives negative results. On vaginal examination, the cervix is found displaced to the side opposite to that where the tumour is. Through the fornix a tense, rounded, fluctuating mass is felt projecting downwards. Bimanually the uterus is felt not enlarged, but is displaced to the one side and is distinct from the tumour, which can be mapped

out between the hands. Usually the uterus and tumour are not very movable, owing to the limited space of the pelvic cavity. When the tumour is tapped, ovarian fluid is got.

3. *Differential diagnosis.*—When *lateral* to the uterus, they require to be differentiated from the following:—

(1.) Pelvic cellulitis;
(2.) Pelvic peritonitis (encysted serous effusions);
(3.) Parovarian cysts;
(4.) Hydrosalpinx, Pyosalpinx;
(5.) Fallopian-tube gestation;
(6.) Fibroid and fibro-cystic tumours of uterus;
(7.) Blood effusion;
(8.) Solid ovarian tumours.

(1.) *Pelvic cellulitis.*—With this we have inflammatory history and probable cause (as abortion or labour) to guide us. When the cellulitis has gone on to suppuration, there will be rigors and other indications of suppuration. Cellulitic deposits, unless when in the broad ligament, are always fixed; are firm when not purulent, and even when purulent do not give very distinct fluctuation.

(2.) *Pelvic peritonitis.*—This will not cause the fornix to bulge downwards, and the history will help us. Tapping gives serum, and not ovarian fluid. When an ovarian tumour is fixed by peritonitic adhesions, it will be almost impossible to diagnose it from encysted pelvic peritonitic effusion except by examination of the fluid.

(3.) *Parovarian cysts* are not so rounded and have very distinct fluctuation; their secretion is usually simple salt and water.

(4.) *Hydrosalpinx and pyosalpinx* are high in pelvis, tortuous, elongated from side to side.

(5.) *Extra-uterine gestation.*—The symptoms and signs of pregnancy with a tumour beside the uterus corresponding to the period of amenorrhœa (sometimes masked however by irregular hæmorrhages from the uterus) point to extra-uterine gestation.

(6.) *Fibroid and fibro-cystic tumours of uterus* (*v.* Section V.).

(7.) *Blood effusion* in the broad ligaments is more difficult to diagnose during life, but sudden onset with history of fainting and pallor are found (*v.* Chap. XVI.).

(8.) *Solid ovarian tumours* are rare. When malignant, there are often nodules in the fornices and ascitic fluid which shows the cells shown at Plates IX. and X.

Diagnosis of Pelvic Ovarian Tumours when small and posterior to Uterus.

(*b.*) *Pelvic Ovarian Tumours posterior to Uterus.*

1. *Symptoms.*—The most noticed ones are associated with urination; there may be either retention or constant desire to micturate. There is no menorrhagia.

2. *Physical signs.*—Palpation, auscultation, and percussion give the same result as when the tumour is lateral. On bimanual examination, the uterus is felt markedly displaced to the front but is not enlarged; and bulging downwards behind the cervix, the round globular cystic ovary can be grasped. Tapping gives ovarian fluid.

Differential diagnosis.—When *posterior* to the uterus, they require to be differentiated from the following conditions.

(1.) Encysted serous peritonitic effusion,
(2.) Retro-uterine hæmatocele,
(3.) Fibroid and fibro-cystic tumours of the uterus,
(4.) Retroverted gravid uterus and extra-uterine fœtation,
(5.) Parovarian cysts.

(1.) *Peritonitic effusion* has an inflammatory history; it is not so rounded nor so well defined above. The fluid is serous.

(2.) *Retro-uterine hæmatocele* has, after the blood has coagulated, a hard feeling and is more expanded transversely. There is a history of sudden onset, menorrhagia, and subsequent inflammatory symptoms.

(3.) *Fibroid and fibro-cystic tumour of the uterus* (*v.* Section V.).

(4.) *Retroverted gravid uterus and extra-uterine gestation.*—In both of these there will be the signs and symptoms of pregnancy; the amenorrhœa in the latter case may be masked by hæmorrhages from the uterus.

(5.) *Parovarian cysts.*—The character of the fluid is our only certain guide.

It should be specially noted that these pelvic ovarian tumours are apt to cause *pelvic inflammation*, and thus render the exact diagnosis, unless aided by tapping, very difficult.

B. DIAGNOSIS OF OVARIAN TUMOURS WHEN LARGE, MULTILOCULAR, AND PEDICULATED (CHIEFLY ABDOMINAL IN POSITION).

1. *Symptoms.*—These are chiefly due to its bulk. The patient's notice is attracted to the fact that she is getting rapidly stout. Diagnosis when large.

2. *Physical signs.*—When the patient lies on her back and the abdominal surface is exposed, the following points can be noted.

On *inspection* the abdomen is seen to be greatly distended. The distention may be uniform, but is often more or less markedly lateral. The distance from the anterior superior spinous process to the umbilicus is greater on one side than the other. The superficial abdominal veins may be dilated, and lineæ albicantes are sometimes present.

On *palpation*, the distention is felt to be due to an encysted collection of fluid. A mass is felt in the abdominal cavity which is like a sac filled with fluid. Fluctuation is got by placing one hand at a special part and tapping at an opposite point with the fingers of the other hand. However long the tumour be manipulated, *there is never felt any muscular contraction of the cyst wall.*

On *percussion* when the patient lies dorsal, a dull note is obtained over the tumour (fig. 138); but at the flank where the tumour does not bulge, it is clear and tympanitic, since the intestines are there. When the patient turns on her side, with this flank uppermost, the dulness and tympanitic note do not change in position. This sign shows we have to deal with an *encysted* collection of fluid.

Auscultation gives entirely negative results. No sound is heard unless that of friction over a localised peritonitis.

On *vaginal examination*, the uterus is felt displaced to one or other side, or very much to the front. It is rarely retroverted, and—unless impregnated—is not enlarged. The tumour does not usually bulge down into the fornices, but may be made out bimanually.

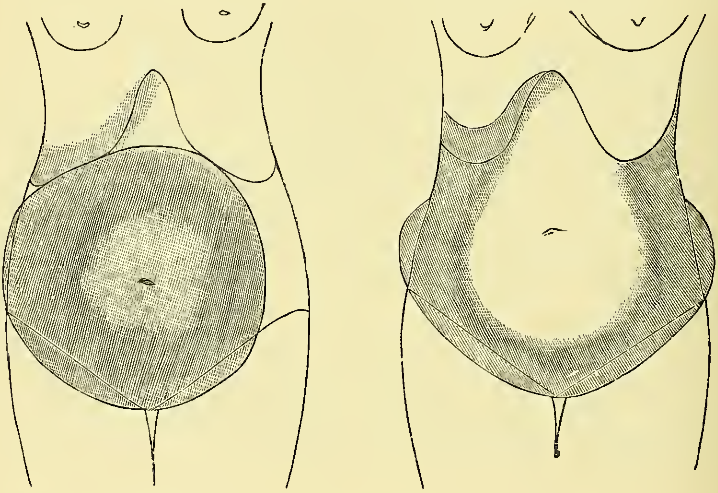

FIG. 138.

The shaded portion shows the dull area: left figure, ovarian tumour; right figure, ascites (*Barnes*).

In order to ascertain how the pedicle lies, we have to make the examination *per rectum.* The tumour is drawn upwards in the abdominal cavity by an assistant. We now lay hold of the cervix with a volsella, pass the index finger of the right hand into the rectum, make traction on the cervix till the fundus is brought within reach of the rectal finger. We recognise a tense band passing from one angle of the fundus, and the enlarged ovarian artery may be felt pulsating in it. We now examine for the ovary of the opposite side, to ascertain if it is normal in size. The possibility of both ovaries being cystic (which would produce a pedicle on each side), should not be forgotten, though this is comparatively rare. The examination with the volsella is made easier by placing the patient *in the genupectoral posture;* the weight of the tumour makes it gravitate into the abdomen, and renders the pedicle tense; it is also easier to make the rectal examination in this position.

Differential Diagnosis.

3. *Differential Diagnosis.*

They must be diagnosed from the following conditions:—

(1.) Pregnancy and Hydramnios,
(2.) Fibroma uteri,
(3.) Ascitic fluid,
(4.) Fibrocystic tumours of the uterus,
(5.) Parovarian tumours,
(6.) Encysted dropsy,
(7.) Thickened omentum enclosing intestines by adhesions,
(8.) Omental tumours,
(9.) Renal tumours,
(10.) Hydatid of liver,
(11.) Pseudocyesis,
(12.) Distended bladder.

In examining a case of abdominal tumour, the practitioner first makes his examination systematically—in every case what is called the routine examination, noting what he observes. By this means he may get facts enough to warrant his drawing a positive conclusion as to its nature. This, however, is not always the case, and he has then to use diagnosis *by exclusion:* it must be one of a certain fixed number of things, and the possibilities are excluded one by one till a definite diagnosis is reached. When examination is unsatisfactory, it should be repeated under chloroform.

We have stated above that ovarian tumours require to be diagnosed from twelve conditions. On each of these we make some brief remarks.

(1.) *Pregnancy.*—At the period of pregnancy when the uterus is so enlarged as to be above the pelvic brim, certain conditions are present. These are suppression of menstruation for a given period, and size of the uterus corresponding to this; mammary signs; lineæ albicantes, and pigmentation. On palpation, we feel a tumour without distinct fluctuation and *having intermittent contractions;* the fœtus can be palpated out. The fœtal heart (after the fourth month) and the uterine souffle are heard. The vagina is dark in colour, the mucous secretion increased, and the cervix soft.

We need hardly say that palpation, the fœtal heart-sounds, bruit and vaginal changes mark out the pregnancy unmistakably. These points may seem too simple to require mention, but cases have been recorded where the pregnant uterus has been tapped for an ovarian cyst.

Hydramnios may simulate an ovarian cyst. The amenorrhœa will help, and especially the occurrence of intermittent contractions as Braxton Hicks has specially pointed out. In one of his recorded cases, the tumour was the size of a seven months' uterus with distinct fluctuation, and there was amenorrhœa for five months. Palpation gave the uterine hardening. Previous to this it had been tapped as a cystic ovarian tumour.

(2.) *Fibroma uteri* (*v.* Section V.).

(3.) *Ascitic fluid.*—When the patient lies on the back, percussion gives a tympanitic note at the umbilicus and a dull one at the flanks (fig. 138); when on the left side, the note is dull on that side and clear over the right; when on the right, it is dull on that side and tympanitic on the left; when she sits up, the upper limit of the dulness is curved with the convexity downwards.

The reason of this is evident. The intestines float on the fluid at its highest point, and give the tympanitic note accordingly (fig. 138).

(4.) *Fibrocystic tumours of the uterus* are difficult to diagnose. The following points should be noted. Fluctuation is only partial and the consistence is variable; the rate of growth is slower; and the fluid drawn off coagulates spontaneously (*Atlee*). It is often difficult to distinguish these from ovarian tumours, and the best operators have sometimes failed to do so (*v.* Section V.).

(5.) *Parovarian tumours* have very well-marked fluctuation, have their characteristic fluid, and when once tapped do not usually refill as they are often retention cysts.

(6.), (7.), and (8.). In many cases we can make out that the tumour does not pass down into the pelvis and is not connected with the uterus. Sometimes the case is obscure, and abdominal incision alone clears matters up.

(9.) *Renal tumours* grow downwards and inwards, have all their edges rounded, and do not as a rule project posteriorly. When right-sided, the colon lies between them and the liver. Their fluid contains urea.

(10.) The *hydatid* is connected with the liver and contains hooklets.

(11.) In *Pseudocyesis*, the percussion note is tympanitic and the swelling disappears under chloroform.

(12.) The *distended bladder* is of course emptied by the catheter.

WHEN LARGE AND EXTRAPERITONEAL (OFTEN PAPILLOMATOUS).

In this class the tumour is not pediculated, and in its extraperitoneal burrowing growth pushes aside uterus, bladder, or large intestines, so that extreme displacement of these may take place (*v.* fig. 7, Pl. XI.). It is therefore of importance in the diagnosis of large abdominal cysts to ascertain the position of the uterus, and also the percussion note so as to make out if large intestine is displaced. When these tumours develop laterally, the displacement of the uterus is an aid to diagnosis; when posterior to the uterus, however, their diagnosis is less easy, as they may only slightly displace the uterus. They usually then bulge well down into the pelvis, lying below the peritoneal level. Their existence should therefore be suspected—

(1.) If uterus or bladder is displaced markedly;
(2.) When over a cyst of size sufficient to displace the small intestine, we get a tympanitic note. This indicates displacement of large intestine, which can only be done by an extraperitoneal cyst.

DIAGNOSIS OF ADHESIONS.

Diagnosis of Adhesions.

When pelvic, the fixation of the tumour they cause can be felt. Adhesions are often the result of tapping; they may also arise from mere pressure. Careful inquiry should always be made as to the history of inflammatory attacks. On palpating the tumour, one can often feel friction. On making the patient take a deep breath, it should be noted whether the abdominal walls move over the surface of the tumour. Much less importance is attached nowadays to the existence of abdominal adhesions. When pelvic, especially if to the bladder or deep in the pouch of Douglas, they are more serious.

CO-EXISTENCE OF PREGNANCY AND OVARIAN TUMOUR.

Co-existence of Pregnancy.

It should be kept in mind that pregnancy may co-exist with an ovarian tumour, giving its own special symptoms and physical signs in addition.

CHAPTER XXIV.

OPERATIVE TREATMENT OF OVARIAN TUMOURS.

LITERATURE.

Atlee—The General and Differential Diagnosis of Ovarian Tumours: Philadelphia, 1873. *Bantock*—First Series of Twenty-five Cases of Completed Ovariotomy: Brit. Med. Jour., 1879, p. 766. Specimen illustrating the changes in the Pedicle of an Ovarian Cyst when treated by Ligature: Tr. Lond. Obst. Soc., XIV., 1872. Early Operative Treatment of Ovarian Cysts: Lond. 1882. *Cheyne, Watson*—Antiseptic Surgery: Smith, Elder, & Co., London, 1882. *Chiara*—Accidental Puncture of Pregnant Uterus: Annali di Ostetricia, etc., 1885, 412 and 453. *Goodell, Wm.*—Article "Ovariotomy:" in Vol. II., American System of Gynecology and Obstetrics (edited by Mann). See also Amer. Jour. of Obst., Jan. 1888. *Hegar und Kaltenbach*—Die operative Gynäkologie: Stuttgart, 1881, S. 201. *Lee, C. C.*—Accidental Puncture of the Pregnant Uterus: Amer. Jour. Obstet., 1885, 190. *Lister*—Address on the Treatment of Wounds: Lancet, Nov. 19 and 26, 1881. *Mahomed*—Lancet, 1879. *Miner*—Ovariotomy by Enucleation: Philad. Intern. Cong. Tr., 1877. *Mundé, P. F.*—The Value of Electrolysis in the Treatment of Ovarian Tumours: Am. Gyn. Tr., Vol. II., p. 348. *Semeleder*—Twenty Cases of Ovarian Cysts treated by Electrolysis: Am. Jour. of Obst., XV., 515. *Sims, J. M.*—Thomas Keith and Ovariotomy: Am. Jour. of Obst., April 1880. *Tait, Lawson*—On Axial Rotation of Ovarian Tumours leading to their Strangulation and Gangrene: London Obst. Tr., Vol. XXII., p. 86. The Antiseptic Theory tested in Ovariotomy: Lond. Roy. Med. and Chir. Tr., Vol. LXIII., p. 161. Recent Advances in Abdominal Surgery: London Intern. Cong. Tr., 1882. Diseases of the Ovary: Birmingham, 1883. *Thornton, J. K.*—The Silk Ligature as a means of securing the Ovarian Pedicle: Brit. Med. Jour., 1878, p. 125. Also, "Rotation of Ovarian Tumours; its Etiology, Pathology, Diagnosis, and Treatment:" Inter. Jour. of Med. Sc., Vol. XCVI., p. 357. *Wells, Sir T. S.*—Ovarian and Uterine Tumours: Lond. 1882. Recent Advances in the Surgical Treatment of Intraperitoneal Wounds: London Intern. Cong. Tr., 1882. Additional Cases of Ovariotomy performed during Pregnancy: London Obst. Tr., Vol. XIX., p. 184. See also Index of Recent Gynecological Literature in the Appendix.

Treatment of Ovarian Tumours.

REMOVAL of the ovarian tumour, or Ovariotomy, is the treatment now practised. Other methods have, however, been employed; a brief *resumé* of these will be useful to the student.

Exploded Methods.

These methods have been tapping, tapping and injection of the cyst with iodine, electrolysis, drainage into the peritoneal cavity or through the vagina.

Tapping is not a method of treatment followed by cure, and should be used only when it is absolutely necessary to obtain fluid for diagnosis. It may cure parovarian cysts, but it is best to remove them by abdominal section. Ovarian cysts are not retention cysts but have a proliferating lining membrane, for which reason tapping does not cure them. An additional reason against tapping is that it is a procedure by no means free from danger, even to life. By oozing of the fluid through the puncture, adhesions are set up:

in some cases, septic peritonitis has proved fatal. Tapping, further, is only palliative and must be followed by ovariotomy.

Method of Tapping.—See that the bladder is empty. With the patient lying on her back make an incision through skin and fat for about an inch, and midway between umbilicus and pubes. Then plunge in the trocar seen at fig. 140. To the side-tube a long piece of tubing is attached, which dips under water. While the fluid is flowing, the patient lies on her side. No bandage is necessary. Care should be taken to prevent regurgitation of air, and a suitable dressing should be applied to the wound (*vide* under Ovariotomy).

Tapping and injection of the cyst with iodine is a procedure not now practised, owing to the risks and uncertainty attending it.

Electrolysis was at one time advocated as a means of cure. Its pretensions to this are unfounded, and few now practise it. Its use has been carefully considered by Mundé of New York, and Semeleder, city of Mexico, in the articles cited, which may be consulted for details and information.

Drainage into the peritoneal cavity, or through the vagina.—The former is dangerous, and the latter is practised only where the cyst is immovably fixed by adhesions.

One fact must be finally noted. Cases of cure of ovarian cysts by tapping, drainage, or electrolysis, are sometimes recorded. These cysts have probably not been ovarian but cysts of the broad ligament—parovarian. Mere tapping often cures the latter. Electrolysis does the same. Electricity has nothing to do with it, the puncture of the needle is enough.

OVARIOTOMY.

This used to be performed either by vaginal or abdominal incision. The former is now never employed.

VAGINAL METHOD.

This was practised when the tumour was pelvic and small. Thomas of New York, Goodell of Philadelphia, Gilmore, Hamilton, and others have recorded cases. The following was the plan of procedure. Vaginal Ovariotomy.

Chloroform or etherize the patient. Place her semiprone or in the lithotomy posture. Pass the Sims speculum. Incise the posterior vaginal wall behind the cervix, in the middle line. Tap the tumour with an aspirator, and then draw it through the incision with the finger or curved forceps. Ligature the pedicle with thin carbolised silk threaded on a handled needle, and divide it on the side next the tumour. Pass a T-shaped drainage tube into the wound which may be stitched round it or left open. Should the temperature rise or the discharge become fœtid, irrigate daily with weak carbolic lotion (1-100).

ABDOMINAL METHOD.

The question used to be discussed as to the best time to operate in a case of ovarian tumour—whether, if small, one should wait until it is large. The opinion now held is that one should operate whenever the tumour is diagnosed without reference to its size. Abdominal Ovariotomy.

Let us suppose, then, that the ovariotomist has a patient—who is otherwise healthy—with an ovarian tumour free from adhesions, and that her period has occurred ten days before. How is the operation performed?

If the patient has not been in any way confined to bed, it is probably better to delay the operation till another period has passed, in order to accustom her to an invalid's life. A pulse and temperature chart should also be taken for a few days prior to the operation. She is kept on light diet, and has no solid food for six hours previous to the administration of chloroform. On the evening prior to the operation, castor oil should be given and an enema used in the morning.

Requisites for Operation.

The following are the requisites for operation :—

Chloroform and ether ;
Hypodermic syringe ;
Spray (?) ;
Carbolic lotion ;
Porcelain trays for instruments ;
Sponges (a definite number), some small and fixed on sponge-holders ;
Waterproof, with oval opening of which the edges are coated with adhesive plaster ;
Ordinary knives ;
Probe-pointed curved bistoury ;
Scissors, straight and curved ;
Spatulæ ;
Dissecting and dressing forceps ;
Péan's or Wells' artery forceps—a definite number (12) of pairs ;
Tenacula, blunt hooks ;
Needles on fixed handles ;
Aneurism needle ;
Fine catgut for bleeding vessels ;
Carbolised silk (Nos. 3 and 4) ;
Two pairs ovariotomy forceps (Nélaton's or Keith's) ;
Wells' trocar ;
Clamp (in reserve) ;
Cautery, actual or Paquelin's ;
Cautery-clamp ;
Long straight needles, threaded two on each suture of silk-worm gut ;
Needle-holder with small needles on horse-hair sutures ;
Drainage tubes (glass or ordinary) ;
Reflecting mirror ;
Iodoform, iodoform gauze, salicylic wool, flannel bandages.

Assistants.

The assistants necessary are three in number, viz., one for chloroform, one for instruments, one to help the operator. It is good however for the operator alone to handle the instruments, and thus two assistants are sufficient. A trained nurse who can pass the catheter and administer purgative or nutritive enemata, is necessary. The patient is placed on an ordinary table, of convenient height and length, and lies on her back. The table is placed so that the patient's feet are towards the window. The legs and chest are to be warmly covered, and hot-water bottles should be laid at her sides and feet. The room should be comfortably warm. The best position for the operator is to stand on the patient's right side, with his back to her feet and to the window. The question of the use of antiseptics in ovariotomy will be discussed afterwards. The instruments are placed near the operator in shallow porcelain trays, and in 1-40 carbolic solution.

Sponges. The sponges should be soft, fine, and thoroughly clean. Twelve are sufficient. Some are small and on sponge holders; one is large and flat. They should be thoroughly wrung out of warm 1-60 solution. *The sponge assistant should know how many sponges he has, and should be sure that he has recovered them all before the abdominal wound is closed. Sponges should never on any account be torn up during an operation.*

Spray. The spray, if used, should be placed eight or ten feet from the wound and throw out a finely-divided vapour.

Preliminaries. *Preliminaries.*—The patient, who has had a very light breakfast some hours previously, should be chloroformed or etherized; the skin washed and shaved; and the waterproof made to adhere to the skin, so that the incision shall bisect the portion exposed through the oval opening. This waterproof keeps the patient dry and comfortable.

The following are the steps of an ordinary operation:—

1. The abdominal incision;
2. Evacuation of the cyst contents;
3. Drawing out of the cyst from the abdomen;
4. Securing of the pedicle;
5. Treatment of adhesions, and bleeding from them;
6. The peritoneal toilette;
7. Closure of the abdominal wound;
8. Drainage—when necessary;
9. Dressing of the wound;
10. After-treatment—complications.

Incision. 1. *The abdominal incision.*—This is usually four inches long, is made in the middle line, and has its lower limit about an inch above the symphysis. It passes through—

skin,
fat,
linea alba,
extraperitoneal fat,
peritoneum.

Sometimes the linea alba is missed, and the rectus muscle cut into. By passing a probe in towards the middle line, the operator gets the right track and thus avoids bleeding. The extraperitoneal fat is a good landmark. All bleeding points are carefully attended to before the peritoneum is opened. They may be seized with Péan's forceps which are left on for a time, or they may be ligatured with catgut. When the extraperitoneal fat is reached, it is picked up with two Péan's forceps so as to get a short transverse fold; this is cut, and the manœuvre repeated until the peritoneal cavity is opened. The cyst is then exposed.[1]

Methods of Evacuation.

2. *Evacuation of the cyst contents.*—This may be accomplished in various ways. Wells' trocar (fig. 139), with its point projected, is plunged in, and the fluid passes along the thick tube to a suitable pail below the table. As soon as the trocar enters the cyst, the shield is pushed out to guard the point. The trocar has teeth for catching up the cyst wall. Keith uses a large aspirator, so as to empty speedily. Schroeder used no trocar, but simply cuts in with his knife and squeezes the fluid out. The kneed trocar may be used (fig. 140), but a simple large trocar without toothed catch is best. When the fluid is very thick it may not flow, and have to be squeezed or scooped out. Secondary cysts, if large, are also perforated.

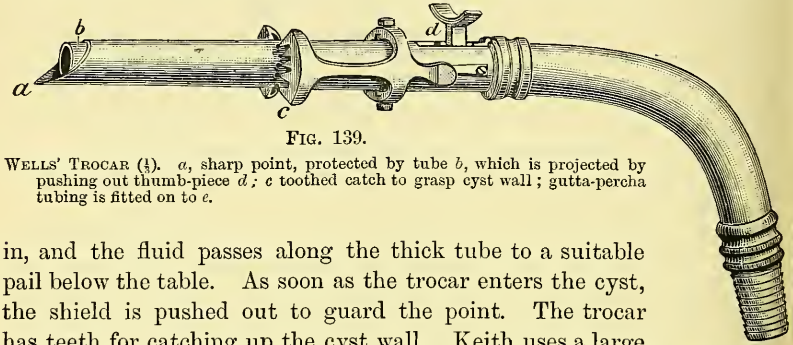

FIG. 139.

WELLS' TROCAR (⅓). *a*, sharp point, protected by tube *b*, which is projected by pushing out thumb-piece *d*; *c* toothed catch to grasp cyst wall; gutta-percha tubing is fitted on to *e*.

While the fluid is being evacuated an assistant keeps up steady pressure on the abdominal walls, in order to prevent fluid from passing in or the intestines from passing out.

Cyst drawn out.

3. *Drawing out of the cyst from the abdomen.*—This is accomplished by seizing the collapsed walls of the tumour with Nélaton's (fig. 141) or Keith's forceps, and steadily pulling it out. The assistant still keeps up pressure. By this means the operator now has the pedicle at the abdominal incision, and the cyst outside. The assistant by means of sponges keeps back the intestines should they attempt to protrude.

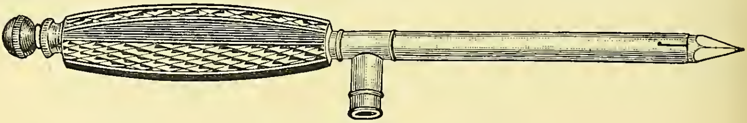

FIG. 140.

TROCAR FOR TAPPING. Tubing is fitted to side-piece.

Cyst separated.

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[1] Sometimes the cyst develops between the layers of the broad ligament (*v.* Pl. XI., fig. 7), lifts up the anterior lamina, and strips the peritoneum off the anterior abdominal wall. When the operator has cut through the abdominal muscles he is puzzled by finding no peritoneum. Puncture and dragging out the collapsed cyst will, however, clear up matters.

Securing of Pedicle.

Securing of the pedicle.—This is one of the most important steps of the operation. There are three methods which may be used, viz.—

The clamp,
The cautery,
The ligature.

Of these, the clamp is now seldom used. Keith and others advocate the cautery; but the ligature and dropping back of the pedicle is the favourite and probably the best method. The clamp may be necessary if the pedicle is thick.

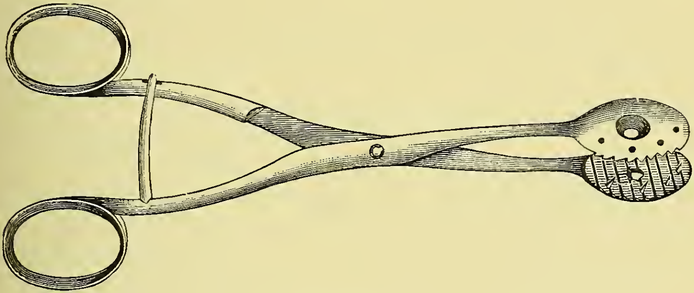

Fig. 141.
Nélaton's Forceps.

By Clamp.

The clamp was introduced by Jonathan Hutchinson, but, as already said, is now yielding to the ligature. The varieties of clamp are numerous. Fig. 142 shows Wells'; it consists of two short arms jointed together and provided with a screw and removable handles. It is used as follows.

The clamp is held by its handles and made to grasp the pedicle between the cyst and the uterus; the bars of the clamp proper are then approximated, and the screw tightly screwed up. The pedicle is examined to see that it is grasped and equally compressed; if one part is thin, Spencer Wells recommends that the pedicle be first secured with a ligature. The pedicle is treated extra-peritoneally with the clamp, which rests on the skin. The great advantage of the clamp is its security against hæmorrhage. Its evident disadvantages are the following:—It does not suit all cases, as it cannot be used when the pedicle is too large or too short; it may cause ventral hernia; it exercises undue traction on the uterus; but,

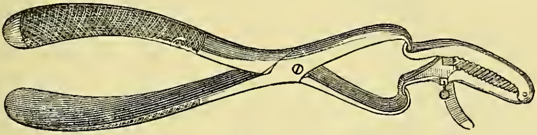

Fig. 142.
Wells' Clamp (½), with removable handles. The serrated part with the screw is the clamp proper.

above all, it may cause a slough deeper down than the skin, and the discharges, passing into the peritoneal cavity, may do great mischief. Thus the mortality was high (25 p.c.) in cases where the clamp was used.

By Cautery.

The cautery was introduced, as a means of treating the pedicle, by Baker Brown of London.

In order to use the cautery, we need a special cautery-clamp and either cautery irons or Paquelin's cautery. Keith uses ordinary cautery irons heated in a little charcoal brazier. The *cautery-clamp* has two hinged bars provided with handles; each bar has one surface which is made of ivory—a non-conductor—and is placed next the skin; the other surface is made of metal; one of the bars has on its metal surface a metal upright running the whole length of the bar. The pedicle is seized with the clamp (ivory side next to the skin), and the screw turned to fix it. Then the cyst is cut off, so as to leave about an inch of the pedicle on the metal side. The dull cautery iron, which is hatchet-shaped, is then passed firmly over the surface, in the angle between the horizontal bar and the upright, until the pedicle is seared flush with the clamp. The pedicle is now caught at the under surface of the clamp with two pairs of forceps, and the clamp removed. If all is right, the pedicle is dropped into the abdomen after the peritoneal toilette is finished.

By Ligature.

The ligature should be thin carbolised Chinese silk No. 3 or 4. It is used in the following way.

A double silk ligature is threaded on a *blunt* needle. The pedicle is transfixed with this, and the ligature cut. Thus we have two ligatures through the pedicle; one is passed round the one half of the pedicle, the other round the other half. They may be made to interlace first so as to make a figure of eight. Each is tied firmly in a reef knot. The pedicle is then seized with Péan's forceps, one on each side below the ligature; the cyst is clipped off about half an inch on the cyst side of the ligature; while the pedicle is still held up by the forceps it can be carefully examined to see if any bleeding occurs. It should be noted whether the ligature splits the pedicle vertically so as to cause bleeding; if so, the ends of the thread can be made to surround the whole pedicle below this. If there is no bleeding, the ligature is cut short and the pedicle dropped into the pelvis.

The raw end of the pedicle may be stitched with catgut to the broad ligament, so as to prevent its adhering to and constricting intestine (*Thornton*).

When the pedicle is thick and fleshy it may require to be tied in three portions as follows:—Pass a double thread so that its shorter half will embrace only *one-third* of the pedicle; withdraw the needle, but keep it still running on the thread, and use it to carry the longer half of the thread through a second point so as to embrace the *middle third* of the pedicle; one portion of the longer half thus forms a loop round the middle third, while the other portion embraces the *other third* of the pedicle. Tait's knot may also be used (*v.* p. 211).

After the pedicle has been secured by one of these methods, the other ovary should be examined and if cystic removed also.

Changes in Pedicle.

The distal portion of the pedicle does not slough. According to Thornton, we may have the five following results.

(1.) Adhesion of the peritoneal surfaces on opposite sides of the ligature, and absorption of ligature.

(2.) Lymph effused over ligature and end of stump, formation of new vessels.

(3.) Adhesion of pedicle raw surface to some neighbouring peritoneal surface and passage of blood-vessels between.

(4.) Hæmorrhage from pampiniform plexus at outer edge.

(5.) No change or sloughing if patient dies soon.

Treatment of Adhesions and Bleeding.

5. *Treatment of adhesions and bleeding.*—Adhesions in certain cases may give a great deal of trouble. They may be at any point of the periphery of the tumour. When close to important viscera (especially the bladder, intestine, or liver) they are serious. Their treatment is best considered as follows:—(*a.*) when short, (*b.*) when long.

(*a.*) When easily separable, these may be detached by sponging. If the cyst is connected with the anterior abdominal wall, it is sometimes cut into. The operator then separates the cyst from the wall by passing his finger in between them where the adhesion ceases; or he may evert the abdominal wall, and strip the cyst off it with dissecting forceps. Spencer Wells recommends in bad cases to evacuate the cyst, and then, by seizing the posterior wall of the cyst with a hand passed into the interior, to evert it and afterwards separate the adhesions. Pressure with sponges or ligatures will arrest any bleeding, or the cautery may be applied. If the bleeding is intractable, a good plan is to pinch up the abdominal walls at the bleeding part and pass a long straight needle through this fold, so as to keep the bleeding peritoneal surfaces in apposition.

Adhesions in the region of the sacro-iliac sychondrosis are dangerous owing to the risk of tearing into the large veins or ureter. The possibility of an adhesion to the tip of the vermiform appendix must be kept in mind.

(*b.*) When the adhesions are *long*, they may be ligatured at two points close to the cyst and divided between these.

When adhesions to the bladder are present great care must be taken, as, in separating them, the bladder may be torn into. If this happens, the tear should be stitched with fine silk or catgut, and a catheter kept in for some days. (*Vide* under Vesico-vaginal Fistula.) When adhesions are inseparable, the adherent portion of the cyst may be ligatured all round with silk, and then cut beyond the ligatures; or it may be simply cut all round the adherent portion, and the edges then cauterized.

For reflecting light into the pelvis or other deep parts, an ophthalmoscopic mirror is invaluable.

Peritoneal Toilette.

6. *The peritoneal toilette.*—This term is a convenient one used by German operators to indicate the *cleansing of the peritoneum.* It must be laid down as a cardinal principle in abdominal section that no serum or blood is to be left in the abdomen. The peritoneum should be thoroughly dry, and no oozing points are to be left. The importance of the toilette cannot be too strongly insisted on. Thomas Keith, whose success in ovariotomy is unrivalled, takes the greatest care in this matter, and attributes his success to it. Sims indeed says, "But I think now that it matters very little what we do with the pedicle, whether we use the clamp, the cautery, or the ligature, provided we take every care against the exudation of bloody serum into the peritoneal cavity after the closure of the abdominal wound."

Closure of Wound.

7. *Closure of the abdominal wound.*—This is done as described under Abdominal Section in the Appendix.

Drainage.

8. *Drainage.*—As to drainage, the rule is that none is needed in simple cases. This rule may seem to the student to clash with the invaluable principle that every wound from which there will be discharge ought to be drained. In ovariotomy, however, the peritoneum is an absorbent sac, and the discharge, after a simple operation, is absorbed *before it has time to putrefy* (*Lister*). In complicated cases, as where there have been many adhesions, this drainage by absorption is insufficient; it becomes also dangerous from the amount of serum thrown out, and the risk of its putrefying. *External drainage* is, in such cases, imperative. A perforated glass drainage-tube is passed in at the lower angle of the wound and down into the pelvis. To keep the patient dry, there is laid over the abdomen a piece of thin rubber sheeting with a slit in it through which the tube passes. Over the end of the tube, a sponge or some other absorbent is placed and removed when soaked (Keith). Several pints of serum may thus come away.

Dressing.

9. *Dressing of the wound.*—Where there is no drainage, it is sufficient to dust with iodoform and lay on a pad of iodoform gauze or other antiseptic material. Where a drainage-tube is used we dust the wound as before, lay over it a piece of protective silk and then pack round the tube some antiseptic absorbent wool. The dressing is kept in place by strips of plaster or a loose flannel bandage. If the pulse and temperature do not rise and there is no uneasiness, the dressing is left untouched—in simple cases—for eight or nine days. If there is drainage, the dressing should be changed occasionally according to the amount of discharge.

After-treatment and Complications.

10. *After-treatment: treatment of complications.*—Morphia may be given hypodermically, but only when necessary (*vide* p. 164). Little food is allowed for the first thirty-six hours; hot water should be given *ad libitum*, as it helps flatus. At the end of this time, milk and beef-tea are added. An enema may be administered on the third or fourth day. When flatus is troublesome, a tube may be passed into the rectum. Sickness is often great, and should be treated with mustard poultices over the epigastrium and enemata of beef-tea and brandy. If it persists to the third or fourth day, two or three grains of calomel may be given. Tait recommends thirty or forty grains of Epsom salts each hour until the bowels move.

Complications may be—Secondary hæmorrhage;
High temperature;
Septicæmia.

Secondary hæmorrhage, if from the pedicle or adhesions, must be treated by the reopening of the wound and application of ligatures.

For high temperatures the ice-cap is good. The Americans recommend the more wholesale method of reduction of temperature by Kibbee's ice-cot. Krohne and Seseman of London supply very convenient ice-caps made of block-tin pipe. Quinine in fifteen grain doses should be tried. It is probable that some high temperatures, recorded by ovariotomists, have been due to the absorption by the peritoneum of carbolic acid used in Listerism.

In cases of septicæmia with peritonitis where drainage has been employed, the peritoneal cavity should be washed with very weak carbolic lotion whenever there seems to be any tension or accumulation of putrid fluid; the abdominal incision may require to be reopened for this purpose. The condition should be further treated by iron and stimulants as needed. (*Vide* Treatment of Pelvic Peritonitis.)

Paralysis of the bowel, with great distention and death, has also been noted; as also death from heart clot (Tait). Tetanus has also occurred.

The patient should after convalescence wear an abdominal belt to prevent hernia at the abdominal scar.

ABDOMINAL METHOD WHEN THE TUMOUR IS PAPILLOMATOUS AND EXTRAPERITONEAL.

In such cases (*v.* fig. 7, Plate XI.), a different procedure has to be adopted, viz. Enucleation. The tumour is tapped, drawn on as much as possible, and its peritoneal covering incised so as to include an elliptical portion. The finger is then used to separate the tumour from its capsule, steady traction facilitating this. Bleeding is arrested with forceps or ligature. Goodell, who has given by far the most graphic description of this method, advises that the uterus and bladder be carefully defined, and the separation begun at the uterine side of the tumour where the large blood-vessels enter. The difficulty in the operation is the separation in the pelvis, since the large veins there (as well as the ureter) are apt to be torn. Injury to the ureter is especially dangerous: it is often not recognised, and, unless a fistula form, is fatal. When enucleation is finished, a large oozing extraperitoneal surface is left. Its edges should be stitched to the abdominal incision so as to close it off from the peritoneal cavity, and a glass drainage-tube passed in. Some, however, close this opening and drain *per vaginam.*

Cases like these are the really difficult and dangerous ones. The chance of return or peritoneal infection is very great.

The idea of this method of enucleation is due to Miner of Buffalo, although the pathology of this form was not clearly understood then: indeed, Miner's original paper, inasmuch as it seemed to apply to the ordinary ovarian cyst, was not very intelligible.

THE RELATION OF LISTERISM TO OVARIOTOMY.

Listerism in Ovariotomy.

The Listerian method of treating wounds is based on the now generally accepted theory that the germ-laden air coming in contact with a wound leads to putrefactive changes which may end in septicæmia. Lister found carbolic acid destructive to the activity of these germs; and, consequently, Listerism requires that the air in contact with the wound, and all else that touches it, must be purified either with the spray or lotion. Listerism is in no sense a treatment of wounds, but is a *treatment of wound-surroundings.* The application of carbolic lotion to a wound is a necessary evil, as carbolic acid is an irritant and may be absorbed. In the cases treated by the surgeon, Listerism is of the greatest value; and, with drainage, has worked the most mighty revolution in surgery. In peritoneal operations, however, its good is marred by the fact that the peritoneum absorbs the carbolic lotion, and thus its surface is irritated and often toxic effects ensue. Keith, Tait, and Bantock have therefore abandoned Listerism in abdominal surgery; but Wells and Thornton still carry it strictly out. Listerism has been modified, but only in this, that less importance is now attached to air-contamination of raw surfaces during an operation. Unclean "touch" is the real danger.

Practically most ovariotomists at present trust to modified Listerism, and to drainage when necessary. All Listerian precautions should be used except the spray.

OVARIOTOMY WHEN PREGNANCY IS PRESENT.

Pregnancy and Ovariotomy.

Although pregnancy co-exists with a large ovarian tumour, ovariotomy should be performed. In the paper of Spencer Wells quoted he gives a table of nine cases where the pregnancy varied from the third to the seventh month, with the following results. Only one mother died: the pregnancy went on to full time in five of the cases; in three the child was expelled prematurely, and in one the child was removed at the operation. Puncture of the gravid uterus during the progress of the operation must be guarded against. This may happen if the pregnancy has not been diagnosed and the pregnant uterus mistaken for a secondary cyst; or it may be as in Lee's case that owing to a change of the position of the patient from the dorsal to the lateral posture, the ovarian cyst recedes from the abdominal incision and the uterus lies below it without the changes being noted. When this accident occurs, the treatment depends on the depth of the wound. Should the uterine cavity not be opened, then bleeding is arrested by pressure, the wound stitched with continuous silk suture. If the amniotic cavity is opened into, the same treatment may be adopted (*v.* Chiara's case); or the incision may be suitably enlarged, and the fœtus, placenta, and membranes extracted. The treatment after this may be removal of the uterus by Porro's operation, simple suture of the walls with silver wire, or the Cæsarean section with the modification introduced by Sänger. The question of the treatment of a labour complicated with an ovarian tumour concerns the obstetrician rather than the gynecologist.

CONTRA-INDICATIONS TO OVARIOTOMY.

Contra-indications.

These are universal adhesions and malignant disease. Ordinary ascites, kidney disease, or heart disease, is not a contra-indication unless far advanced. Prognosis should be careful in these cases. In some fatal cases it has been found on post mortem that the kidneys were small and granular from interstitial inflammation. This may be present while there is no albumen in the urine. There is usually a pulse of high tension and cardiac hypertrophy (*v.* Mahomed's articles).

COURSE AND RESULTS OF OVARIAN TUMOURS WHEN LEFT ALONE.

Natural History of Ovarian Cysts.

In some rare cases the operator is unable to remove the cyst after he has begun his operation. He may then stitch the cyst edges to the abdominal walls carefully closing it off from the peritoneum. The best results by this method are got in dermoid and parovarian cysts: they are not good in ordinary ovarian cystomata.

Adhesions may be set up as the result of chronic peritonitis arising from pressure or tapping. Occasionally the cyst bursts, and in the case of the ordinary ovarian tumour we may get rapid death or the condition termed Pseudomyxoma peritonei by Werth (*v.* p. 221). When parovarian tumours burst, the fluid is usually non-irritating and is absorbed by the peritoneum, the patient thus becoming cured. Matthews Duncan and others have recorded cases of burst ovarian tumour rapidly becoming fatal. Waxy disease of the liver, kidneys, etc., may result in those cases where the tumour suppurates and discharges into the bowel or through the skin.

Torsion of the pedicle to a slight extent is often noticed in ovarian tumours. When the torsion is so great as to cut off the blood supply from the cyst, we get gangrene of the tumour, and in some cases very serious symptoms, viz., peritonitis, vomiting, and severe abdominal pains. Wiltshire of London was the first to operate for this condition, and recently Lawson Tait has operated successfully in three cases. His paper should be consulted for details. It is interesting to note that the tumours so rotated are usually right-sided, and not necessarily ovarian. The usual explanation of the rotation is that it is caused gradually by the fæcal contents passing down the rectum. Tait's book and Thornton's paper may be consulted for fuller details.

If peritonitis occur before the tumour is removed, ovariotomy should be at once performed. Keith was the first to do this successfully.

The course and results of ovarian tumours when left alone can fortunately not now be studied. The picture of ovarian disease running its course unchecked, so eloquently described by West, is happily now almost unknown.

"We have symptoms of the same kind as we see towards the close of every lingering disease, betokening the gradual failure, first of one power, then of another; the flickering of the taper, which, as all can see, must soon go out. The appetite becomes more and more capricious, and at last no ingenuity of culinary skill can tempt it, while digestion fails even more rapidly, and the wasting body tells but too plainly how the little food nourishes still less and less. The pulse grows feebler, and the strength diminishes every day, and one by one each customary exertion is abandoned. At first the efforts made for the sake of the change which the sick so crave for are given up; then those for cleanliness; and lastly, those for comfort—till at length one position is maintained all day long in spite of the cracking of the tender skin, it sufficing for the patient that respiration can go on quietly, and she can suffer undisturbed. Weariness drives away sleep, or sleep brings no refreshing. The mind alone, amid the general decay, remains undisturbed; but it is not cheered by those illusory hopes which gild, though with a false brightness, the decline of the consumptive; for step by step death is felt to be advancing; the patient watches his approach as keenly as we, often with acuter perception of his nearness. We come to the sick chamber day by day to be idle spectators of a sad ceremony, and leave it humbled by the consciousness of the narrow limits which circumscribe the resources of our art." (Quoted by Spencer Wells.)

The question of the mortality after ovariotomy is a complex one, owing to differences in cases and also because the use of the clamp in early operations unduly raised the death-rate. Of late years the mortality has fallen considerably, chiefly owing to the use of the intraperitoneal treatment of the pedicle (ligature or cautery) and greater care as to sponges and surroundings. Keith has had 32 cases with one death: and also 76 consecutive cases without a death. Lawson Tait records a series of 101 cases with 3 deaths.

Sir Spencer Wells' Statistics in 1000 cases are given in his well-known work. Thornton gives his mortality, with strict Listerian precautions, as 2 p.c.

SECTION V.

AFFECTIONS OF THE UTERUS.

THERE are three periods during which morbid conditions of the uterus arise.

1. *The period of evolution or development*—from the ovum up to puberty. During this stage they appear as anomalies in development—before birth or during childhood. They produce no marked symptoms, but a recognition of their existence is important as regards the future history of the patient.

2. *The period of physiological activity*—from puberty to the menopause. During this stage there occur in the uterus the morbid processes of acute and chronic inflammation, and of new-formation or tumour-growth; on account of its mobility, the uterus is also liable to various forms of displacement. These pathological processes give rise to symptoms of themselves, and also from their effect on the normal functions of the uterus—menstruation, conception, and pregnancy. During parturition the cervix uteri is frequently lacerated, and this may be the starting-point of important pathological conditions.

3. *The period of senile involution or retrogressive development*—from the menopause to death. The term involution is generally used in the restricted sense of the process which occurs after childbirth, but it is the only one which conveniently expresses the retrogressive changes after physiological activity has ceased. During this stage, the most important pathological process is that of malignant new-formation.

Accordingly the following subjects have to be considered in this Section:—

CHAPTER XXV. Malformations of the Uterus.
,, XXVI. Atresia and Stenosis of the Cervix Uteri.
,, XXVII. Atrophy of the Cervix and Uterus: Superinvolution.
,, XXVIII. Hypertrophy of the Cervix; Amputation.

,, XXIX. Laceration of the Cervix and its Consequences.
,, XXX. Chronic Cervical Catarrh.

Chapter	XXXI.	Endometritis.
,,	XXXII.	Metritis, Acute and Chronic; Subinvolution.
,,	XXXIII.	Displacements of the Uterus: Anteflexion; Anteversion; Retroversion; Retroflexion.
,,	XXXIV.	Inversion of the Uterus.
,,	XXXV.	Tumours of the Uterus. Fibroid Tumour: Pathology and Etiology.
,,	XXXVI.	Fibroid Tumour of the Uterus: Symptoms and Diagnosis.
,,	XXXVII.	Fibroid Tumour of the Uterus: Treatment.
,,	XXXVIII.	Fibrocystic Tumour of the Uterus.
,,	XXXIX.	Polypi of the Uterus.
,,	XL.	Carcinoma Uteri (of Cervix): Pathology and Etiology.
,,	XLI.	Carcinoma Uteri (of Cervix): Symptoms and Diagnosis.
,,	XLII.	Carcinoma Uteri (of Cervix): Treatment.
,,	XLIII.	Carcinoma Uteri (of Body).
,,	XLIV.	Sarcoma Uteri.

CHAPTER XXV.

MALFORMATIONS OF THE UTERUS.

LITERATURE.

Barnes—Diseases of Women: London, 1878, p. 462. *Dirner*—Ein Fall von Uterus didelphys, etc.: Archiv f. Gyn., XXII., S. 463. *Dos Santos, Las Casas*—Missbildungen des Uterus: Zeit. f. Geb. u. Gyn., XIV. S. 140. *Kussmaul*—Von dem Mangel, der Verkümmerung und Verdoppelung der Gebärmutter, etc.: Wurzburg, 1859. *Macdonald, Angus*—Case of Pregnancy in the Left Horn of a Bifurcated Uterus, etc.: Ed. Med. Jour., April 1885. *Mayerhofer*—Die Entwickelungsfehler der Gebärmutter: Billroth's Handbuch für Frauenkrankheiten, Stuttgart, 1878. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1878, S. 33. *Secheyron*—Du Cloisonnement Pelvien Antéro-Postérieur: Annal. de Gyn., XXI. 441 and XXIII. 247 et seq. *Simpson, A. R.*—Case of Double Uterus: Ed. Med. Jour., 1864, p. 957. *Turner*—Malformations of the Organs of Generation: Edin. Med. Jour., June 1865 and May 1866. The standard work is that of Kussmaul. The literature is given by Mayerhofer and Dos Santos. See also Index of Recent Gynecological Literature in Appendix for isolated cases.

Relation of Malformations to Development.

WHAT is usually described as "a malformation" is really a nonformation of one part, involving a relative disproportion. Of this we have an illustration in the uterus. The one-horned uterus is not a malformation," if by this term we mean that the part which is present is maldeveloped; the condition is a result of the *non*formation of the other horn and intervening fundus. It is misleading also to speak of a "double uterus;" the structure thus described is really one uterus, in which the halves have not united into a whole. The word as used, therefore, means an incomplete *result*, not a defective process. *Mal*-development is a contradiction in terms, there can only be *arrested* development.

Malformations must be studied in connection with the normal development of the organ. In this way, they become at once intelligible. There are two processes in the progression of an organ to its mature form—*development* and *growth*. There are therefore two causes which together operate in producing malformations—arrested development and arrested growth. The period of development of the uterus, by which we mean formation of parts, extends up to the twentieth week; the period of growth is much longer, and extends to the twentieth year.

The student should not pass over this section of the subject as of little importance. To the practical man, malformations seem of little value because he has no power of modifying the result. To the scientific man they are, however, of the greatest interest as furnishing him with permanent impressions of the transitional states of development; they are development caught in the act and fixed permanently for after-investigation. In this chapter we recommend the student to read Etiology before Pathology.

PATHOLOGY.

Uterus absent or rudimentary.

Complete absence of the uterus is an extremely rare occurrence, and cannot be demonstrated except on post-mortem examination. It has been described only in cases of fœtal monstrosities. A *rudimentary condition* sometimes occurs; in this the uterus is represented by a band of muscular fibre and connective tissue on the posterior wall of the bladder (fig. 143), and the peritoneum forms a single pouch between the bladder and the rectum (fig. 144).

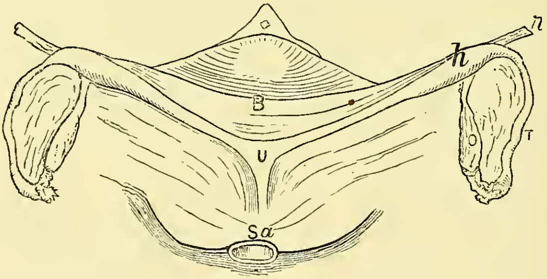

FIG. 143.

RUDIMENTARY UTERUS (*Veit*). *Sa* Sacrum; *U* Solid Rudiment of Uterus; *h* Rudimentary Horn; *B* Bladder; *O* Ovary; *T* Fallopian Tube; *r* Round Ligament.

In the *uterus bipartitus* (fig. 145), rudimentary horns are present and are solid or hollow. The cervix is represented by a fibrous band which connects the horns with one another and with a rudimentary vagina. The ovaries are sometimes well developed, so that ovulation takes place. The breasts and external genitals may be fully formed.

The uterus unicornis (fig. 147) may exist with or without a rudimentary second horn. The vaginal portion of the cervix is small; the palmæ plicatæ within the cervical canal are most marked towards the non-developed side. The body of the uterus is of disproportionate length and curves towards one side. The fundus, by which we understand the fully-developed horn, is small and tapering; it has only one Fallopian tube and ovary connected with it. On the convex side of the somewhat curved body is the representative of the other horn which is either solid or hollow; it is connected with the developed one by fibrous tissue which may or may not form a pervious canal. Connected with this rudimentary horn are the Fallopian tube and ovary of the same side, which are sometimes perfectly developed. In examining preparations of this and other uterine malformations, it is sometimes difficult to determine what is rudimentary horn and what is Fallopian tube. Here development furnishes us with a guide. The insertion of the round ligament indicates the point up to which the ducts of Müller are to be formed first into uterine horn and then into fundus uteri. Accordingly, on examining such preparations we determine the point of *attachment of the round ligament;* all below this is uterine horn, all above it is Fallopian tube. Associated with this malformation we sometimes find absence or rudimentary condition of the kidney of the same side, since the development of the renal is closely connected with that of the generative system.

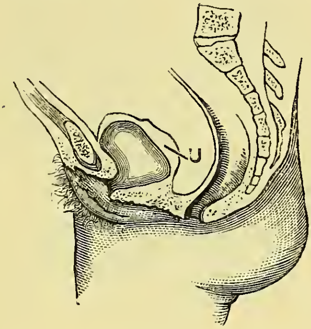

FIG. 144.

The same in its relation to the Pelvic Organs. *U* Rudiment of Uterus on the posterior wall of Bladder. The Peritoneum forms one pouch between Bladder and Rectum. (*Schroeder*)

Round ligament indicates junction of uterine Horn and Tube.

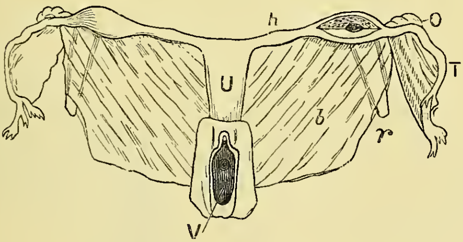

FIG. 145.

UTERUS BIPARTITUS (*Rokitansky*). *V* Vagina; *U* Uterus; *h* Rudimentary Horn; *O* Ovary; *T* Tube; *r* Round Ligament; *b* Broad Ligament.

Uterus Didelphys.

In the *uterus didelphys* the two halves of the uterus remain separate throughout their course; the vagina may be absent, single, or double. It is a rare condition in the living adult female; Dirner gives only seven reported cases of this condition in the adult with no other maldevelopment and having normal sexual functions, and Dos Santos gives references to three others in addition to four seen at the Berlin University Clinique.

Fig. 146 shows a uterus described by Paterson and Coats from a patient who died a fortnight after the delivery of a seven months' child.

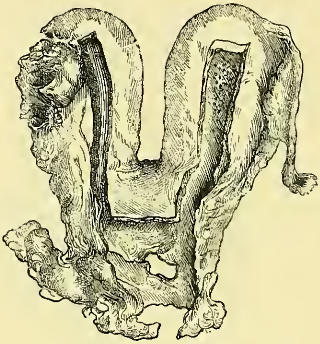

Fig. 146.
Uterus Didelphys (*Coats*).

There are apparently two uteri, which are separate, but open into a common vagina; they are of nearly equal size—the right which contained the fœtus measuring 5 in. and the left $4\frac{3}{4}$ in. in length, and being respectively $2\frac{1}{2}$ and $1\frac{3}{4}$ in. in breadth.

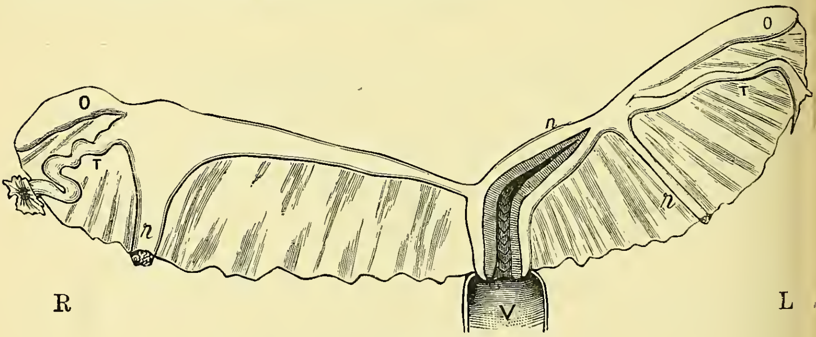

Fig. 147.
Uterus Unicornis (*Schroeder*). *R* Right Side; *L* Left Side. The left horn (*h*) is well developed and communicates with the Uterine Cavity. The right horn is in the form of an elongated band; its point of connection with the Fallopian tube is indicated by the insertion of the round ligament which is hypertrophied. Other letters as in preceding diagrams.

Uterus Bicornis.

By *uterus bicornis* we understand that the separation into two horns is distinctly visible *externally.* Of this there are various degrees, from a mere depression at the middle of the fundus to a well-marked bifurcation, which rarely extends lower than the os internum; the further down the separation extends, the more obtuse is the angle between the divergent horns. There is occasionally a fold of peritoneum, containing muscular fibre and blood-vessels, running from the bladder to the rectum in the hollow between the horns. In addition to this external division, the separation is usually carried further down by an internal septum which may extend to the os externum.

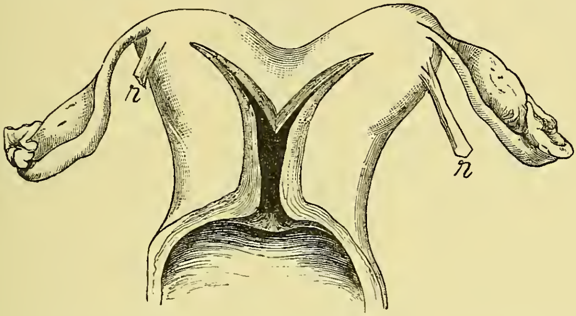

FIG. 148.
UTERUS BICORNIS UNICOLLIS (*Schroeder*). *r* Round Ligament.

Uterus Septus.

In the *uterus septus* (fig. 149) there is no external indication of the internal division. The uterus is divided by a septum beginning at the fundus uteri and extending downwards for various distances, sometimes as far as the os externum. It is otherwise normal.

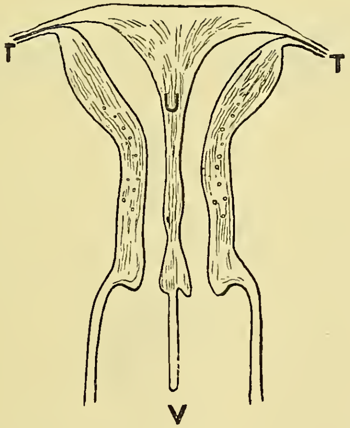

FIG. 149.
UTERUS SEPTUS IN VERTICAL TRANSVERSE SECTION (*Kussmaul*). *U* (Uterus) placed on septum which divides Cavity into two lateral portions; *T* Fallopian Tubes; *V* Vagina divided into lateral cavities by prolongation of septum downwards.

Infantile Uterus. The *infantile uterus* (fig. 150) is characterised by shortness of body and disproportionate length of cervix; in fact the relative lengths of body and cervix remain the same as at birth, from which the name "*infantile*" is derived. The cervix ($1\frac{1}{2}$ inches long) is two or even three times the length of the body ($\frac{1}{2}$ in. to $\frac{3}{4}$ in.). The whole uterus is smaller than normal. The walls (specially those of the body) are thin and the cavity is small.

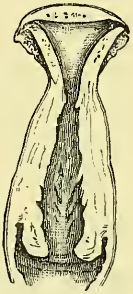

Fig. 150.

Infantile Uterus (*Schroeder*).

Congenital Atrophy of Uterus. The term *congenital atrophy* is applied to cases in which the proportions of body and cervix are of the normal *virgin* type, while the organ as a whole is atrophied (fig. 151). An excess of connective tissue is present in the walls, which makes their consistence firmer. This malformation occurs in scrofulous and chlorotic patients and with cretinism, and is often associated with hysteria and epilepsy.

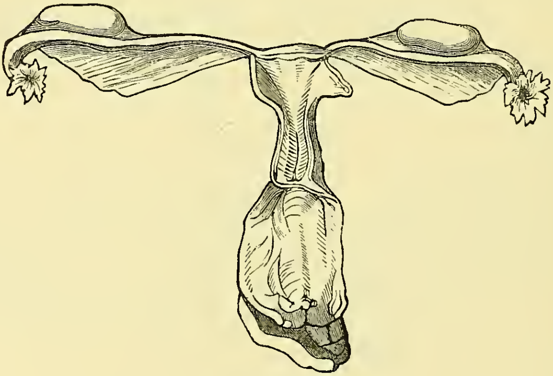

Fig. 151.

Primary Atrophy of the Uterus (*Virchow*).

ETIOLOGY AND CLASSIFICATION.

Five periods in development of Uterus.

Malformations differ according to the period at which development and growth are arrested, and the extent to which they are interfered with. There are five periods in development and growth (*Fürst*), which can be easily remembered when we bear in mind the division of the period of intra-uterine life into ten *lunar months*. In the first period, which extends over the *first* and *second* lunar months (from fertilization to the eighth week), the septum between the adjacent ducts of Müller is as yet unbroken. By the end of the second period, which corresponds to the *third* month (*i.e.* eighth to twelfth week), the septum has entirely disappeared; but the upper portions of the ducts remain distinctly separate, forming the horns of the uterus and the Fallopian tubes. During the third period, *fourth* and *fifth* months, the angle between the uterine horns disappears so that the base of the uterus becomes flat. In the fourth period, *last five months*, the flattened end of the uterus, between the Fallopian tubes, becomes arched through the development of the fundus. The fifth period extends from *birth to puberty*. During this period no important change takes place till, at puberty, the uterus passes from the infantile to the virgin form. It does not, however, cease to grow till the twentieth year.

Classification of Malformations.

We are not yet in a position to refer each malformation in detail to its proper period; but the more perfectly we are able to do this the more satisfactory will our classification be. At present we separate the first four periods from the fifth, and speak of the period of fœtal life in contradistinction to the period of childhood. This forms the basis of our classification.

1. Malformations arising during Fœtal Life. Of these there are the following:—*complete absence* or *rudimentary condition* of the uterus; the *uterus bipartitus*, produced by a development of only the upper parts of the ducts of Müller into rudimentary horns of the uterus and Fallopian tubes; the *uterus unicornis*, due to the development of only one duct; the *uterus didelphys*, due to the development of the ducts separately, without coalescence; the *uterus bicornis*, in which the ducts coalesce below, and the horns remain un-united by a fundus above; the *uterus septus*, in which the coalescence of the ducts and development of the fundus takes place so that the uterus appears normal externally while internally the septum has persisted. These last three are sometimes spoken of as varieties of the double uterus or *uterus duplex*. The association of an antero-posterior reduplicature of the peritoneum with some cases of uterus bicornis is of interest from an etiological point of view, pointing back to some mechanical cause which kept the ducts of Müller from blending. It is interesting that a rudimentary condition of the uterus has been observed in more than one member of the same family.

2. Malformations arising during Childhood. Of these there are the following:—the *uterus infantilis*, in which the uterus does not undergo the development which should take place at puberty, but remains of the same type as it was at birth; *congenital atrophy* of the uterus, in which it assumes the virgin type but the organ as a whole is atrophied.

SYMPTOMS.

The symptoms of malformation consist in an *impairment of function*, and hence do not appear until puberty.

In the external appearance of the patient there is not necessarily anything to attract attention. The figure, features, temperament, and voice are of the feminine type, even though the uterus is not developed. The mammæ may be fully formed. The external genitals may be found well-formed, as their development is independent of the internal organs. It is rare, on the other hand, to find a normal vagina present when the uterus is rudimentary.[1]

Sometimes local symptoms absent.

Complete absence and rudimentary condition of the uterus may give rise to no local symptoms, except the non-appearance of menstruation. If the ovaries are developed, ovulation with associated monthly disturbance is present and the accumulation of menstrual blood in a rudimentary horn may call for operative measures to form a channel for its escape. Even on entering married life the condition need not necessarily attract attention; if the vagina be not well developed, the urethra becomes dilated so as to take its place.

Cause of local symptoms.

In the uterus unicornis, menstruation, conception and pregnancy may go on undisturbed in the developed horn. It is the *imperfectly developed horn which gives rise to symptoms*—the result of the retention of menstrual blood and of the products of conception. If the mucous membrane of this horn discharge blood periodically and there be no communication with the uterus to allow of escape, the blood collects and produces a distended sac—a very rare occurrence. It is of great interest to note that we may have a fertilized ovum growing in the isolated horn; we have not space here to discuss how this interesting condition is produced (fig. 152). Pregnancy has also occurred in the one-half of a uterus didelphys, and the empty half formed an obstruction to labour at term.[2]

Uterus bicornis and uterus septus produce no symptoms, unless one half of the partitioned uterus does not open into the cervical canal—in which case hæmatometra occurs at puberty (*v.* Chap. XLV.). The statement that the patient menstruates regularly throws the practitioner off his guard. He should remember that the menstrual blood *may flow undisturbed from one half of the uterus while it is accumulating*

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[1] As in cases by Kahn-Bensinger's *Centralb. f. Gyn.*, 1887, S. 377; Grechen, *ib.* S. 493; Mundé, *ib.* S. 670; Steinschneider, *ib.* 1888, S. 49; Zweifel, *ib.* S. 474.

[2] Dos Santos, op. cit. See also case by Litschkus, *Zeits. f. Geb. u. Gyn.*, XIV. S. 369.

in the other. In both of these forms we have two possible seats for a growing ovum (fig. 153); and this accounts for super-fœtation, and those curious cases in which an ovum has been expelled in the course of a pregnancy which went on to full-time.[1] When the uterus is double, abortion and premature labour are more frequent; the septum also causes difficulty in delivery, and involution progresses more slowly. It has been noted that a decidua forms in the empty half of the uterus, as it does in extra-uterine gestation, and may be expelled in the puerperium.

The anomaly of menstruation during pregnancy has also been thus explained; Henderson found a double uterus in a patient who menstruated regularly during two of her pregnancies—the flow coming probably from the empty cavity.[2]

The uterus infantilis and the congenitally atrophic uterus are characterised by the absence or scantiness of the menstrual flow and the constitutional nervous disturbance which is usually associated with them.

DIAGNOSIS.

Diagnosis of absence of Uterus.

Complete absence of the uterus cannot be diagnosed with certainty in the living subject. A rudimentary condition may be present, and yet not be detected on the most careful examination. To examine cases in which this condition is suspected, we first pass a sound into the bladder and then with one or two fingers of the right hand in the rectum palpate the tissues which lie between the sound and the fingers. It is evident that in such a condition as is represented in fig. 144 the rudiment of the uterus may escape observation, or be considered as a thickening of the posterior wall of the bladder. We now remove the sound from the bladder, as it only reaches to a limited height in the pelvis, and with the left hand on the abdomen make a careful recto-abdominal examination which, under chloroform, gives much more definite information. If we feel two bodies laterally without any distinct body between, it is impossible to say whether these are rudimentary horns or ovaries.

Diagnosis of Uterus Unicornis,

The diagnosis of the one-horned uterus is not easy. The points to rely on are the following: the fundus turns to one side of the pelvis, is tapering, and has only one ovary connected with it. The rudimentary horn and the other ovary lie removed from it.

Of Uterus Didelphys,

The uterus didelphys is rare. A groove on the external surface of the uterus separating it into lateral halves, so that sounds can be passed into the separate cavities without coming in contact, indicates this condition.

Of Uterus Bicornis.

The uterus bicornis is a comparatively frequent condition, and if well marked is easily recognised. Unusual breadth of the fundus, with a slight depression in the centre, points to a minor degree of this deformity.

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[1] As in Gray's case (*Glas. Med. Journ.*, XXXI., p. 182) where an abortion took place in the sixth week of a normal pregnancy, and Ross's (*Edin. Med. Journ.*, 1885, p. 131) where there was a twin abortion in the sixth month and a full-time labour three months later.

[2] Glas. Med. Journ. XIX. p. 276.

Diagnosis of Uterus Septus. The uterus septus is easily diagnosed if the septum extend as far as the os externum, so as to be within reach of the examining finger. If the septum does not extend so far, the condition may not be detected as there is no change in the external form to direct attention to the internal malformation. The sound may pass with equal ease into either cavity, or always into the same, and thus furnish no indication. In a case that

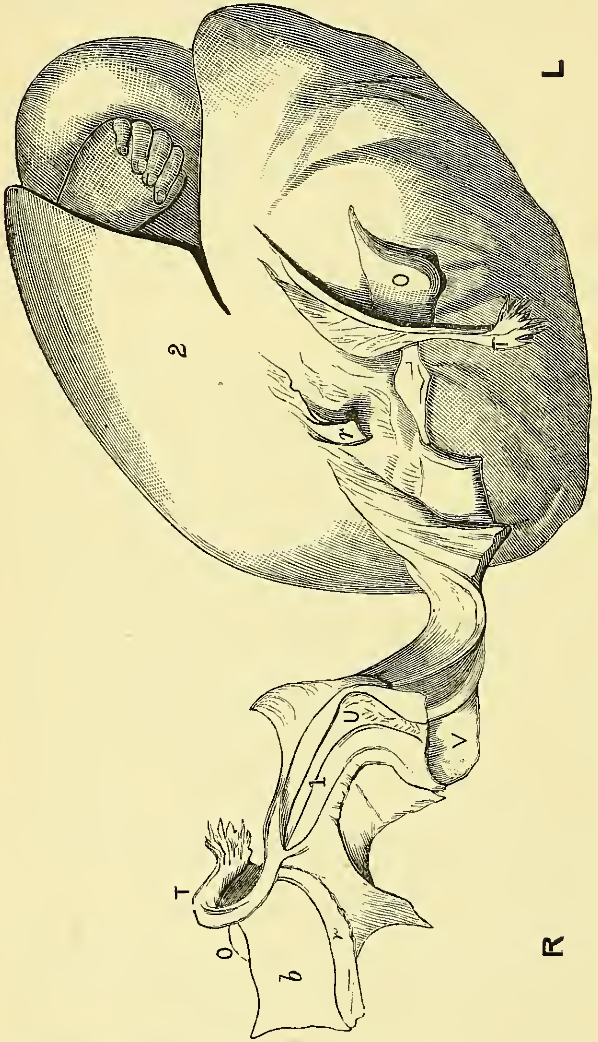

Fig. 152.

One-horned Uterus with Fœtation in the detached left horn (*Turner*). The right horn (1) has its ovary (*O*), Tube (*T*), Round (*r*) and Broad (*b*) Ligaments in normal relation to it. The gestation sac (2) has the left round ligament (*r*) attached to it near the Fallopian tube, and therefore is the left horn; this does not communicate with the Uterine Cavity (*U*). The left Ovary (*O*) and Tube (*T*) are attached near the Round Ligament (*r*).

came under our own observation the patient was examined frequently during life, bimanually and with the sound, and the uterus pronounced normal. At the post-mortem, the external appearance of the uterus was normal; it was only on cutting into it that it was observed that the cavity was divided into two portions by a septum which extended to the os internum.

Of Infantile and Congenitally Atrophic Uterus.

The uterus infantilis and the congenitally atrophic uterus are recognised by their smallness. This is most distinctly made out with the finger in the rectum, the uterus being at the same time drawn down and fixed with the volsella. The well-developed vaginal portion and the unusual length of the cervix, as felt per rectum, enable us to diagnose the infantile from the congenitally atrophic uterus.

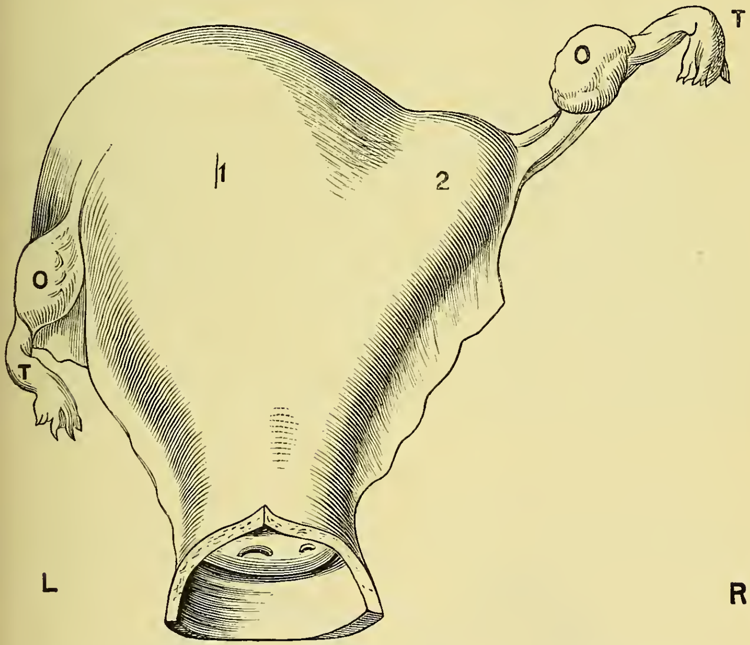

Fig. 153.

Uterus Septus (posterior view) from a woman who died in the puerperium *(Cruveilhier)*. The Uterine Cavity is divided by a septum which extends to the os externum. The left half (1) is strongly developed and contained the fœtus. The right half (2) was empty.

Differential Diagnosis.

With regard to *differential diagnosis*, gestation in a detached horn becomes a condition of great importance to the gynecologist when it simulates a fibroid tumour. The occurrence of irregular hæmorrhages from the empty uterine cavity, the absence of the fœtal heart and uterine souffle when the fœtus is dead, and the difficulty that there may be in palpating fœtal parts, mask the existence of pregnancy. In the cases recorded by Angus Macdonald and Werth, the nature of the case was clear only on abdominal section; Macdonald draws attention to such cases as explaining the phenomena of "missed labour," the occurrence of which might sometimes give a clue.

PROGNOSIS.

Prognosis of Malformations.

In prognosis we must keep in view the possibility of ovulation with menstrual molimina, the secretion of menstrual blood and its accumulation in a closed cavity, the probability of conception and of gestation in an isolated horn. The most difficult cases are those in which the practitioner has to decide whether marriage is justifiable or not.

TREATMENT.

Treatment.

Malformations of the uterus lie beyond the range of treatment, except when they give rise to retention of menstrual blood or of the products of conception. The treatment of the former condition will be considered under Atresia of the Vagina (see Section VI.), and reference will be made to the latter in the chapter on Abdominal Section. Extirpation of the ovaries[1] has been performed, and even of the uterus[2] or its detached horn,[3] for dysmenorrhœa in cases of rudimentary uterus. Cases of congenital atrophy, associated with chlorosis, are amenable to treatment by feeding-up and iron.

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[1] By Kleinwächter, Langenbeck, Peaslee, Savage, Taufer; [2] by Leopold; [3] by Schroeder:—*Las Casas dos Santos* (op. cit.).

CHAPTER XXVI.

SMALL OS EXTERNUM; RIGIDITY, STENOSIS, AND ATRESIA OF CERVIX.

LITERATURE.

Barnes—Diseases of Women: London, 1878, p. 245. *Burton*—So-called Obstructive Dysmenorrhœa: Brit. Med. Jour., 1884, II. 607. *Chrobak*—Die Untersuchung der weiblichen Genitalien: Billroth's Handbuch, Bd. I. S. 106. *Duke*—On the Rapid Dilatation of the Cervix Uteri (with discussion at Brit. Med. Ass.): Brit. Med. Journ., 1888, II., p. 873. *Duncan, Matthews*—On Sterility: Brit. Med. Jour., 1883, I. 702. *Goodell*—Rapid Dilatation of the Uterine Canal: Amer. Jour. Obstet., 1884, p. 1179. *Greenhalgh*—Intra-uterine Pessary: British Med. Jour., June 1878. *v. Grünewaldt*—Ueber die Sterilität geschlechtskranker Frauen: Archiv f. Gyn. VIII. 415. *Mackintosh*—Practice of Physic: London, 1836, p. 481. *Marckwald*—Ueber die kegelmantelförmige Excision der Vaginalportion und ihre Anwendung: Archiv f. Gyn., Bd. VIII., S. 48. *Müller*—Die Sterilität der Ehe: Billroth's Handbuch, Bd. I. S. 385. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1878, S. 64. *Schultze*—Ueber Indication und Methode der Dilatation des Uterus: Wiener med. Blätter, 1879, Nos. 42, 43, 44, 45. *Simpson, Sir J. Y.*—Diseases of Women: Edinburgh, 1872, p. 245. *Sims, Marion*—On the Surgical Treatment of Stenosis of the Cervix Uteri, and Discussion: Am. Gyn. Trans., 1878, p. 54. *Thomas*—Diseases of Women: London, 1880, p. 613. *Vedeler*—Ueber Dysmenorrhoe: Archiv für Gyn., XXI. 211. See Index of Recent Gynecological Literature in Appendix.

ETIOLOGY AND PATHOLOGY.

Etiology and Pathology.

THE various conditions treated of in this chapter have been described mainly from clinical observation and in relation to the symptoms of dysmenorrhœa and sterility. Owing to the absence of exact data, there has been room for great difference of opinion as to the pathology and frequency of these conditions.

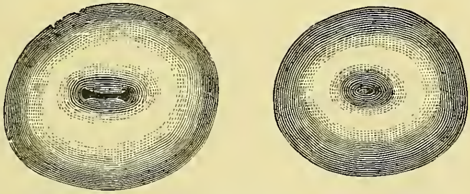

FIG. 154.

A NORMAL AND A PIN-HOLE OS, as seen in the SPECULUM (*Schroeder*).

Small Os Externum.—In a certain number of cases, 6-9 p.c. (Vedeler), the os externum is congenitally smaller than the normal size; it may be so narrow as to admit only a fine probe (pin-hole os). The contrast between this and the normal os is shown in fig. 154. The cervix is conical in form (fig. 155) and of unusually firm consistence; sometimes it is hypertrophied, the vaginal portion measuring as much as two inches. The cervical mucous membrane is frequently in a condition of catarrhal inflammation; according to Von Grünewaldt, the conical shape of the cervix is often the result of the accumulation of mucus.

Rigidity of Cervix.—The changes in the cervix resulting from an increase of its connective tissue have been fully described by Scanzoni. A peculiarly rigid condition of the cervical tissue, apart altogether from any contraction of the canal, is observed on passing bougies in cases of dysmenorrhœa (Matthews Duncan). A similar condition has been noted as specially frequent in cases of sterility (Olshausen, Martin, and Chrobak).

Stenosis (contraction) *of the cervical canal* is congenital or acquired. As a *congenital* condition affecting the cervical canal throughout its whole extent, it is a comparatively rare occurrence. It is always associated with smallness of cervix and body, pointing to generally defective development of the uterus (which is further indicated by the scantiness of menstruation). The commonest cause of the *acquired* form is cicatrisation—after labour, after amputation of the cervix, or after the repeated application of strong caustics; the last is perhaps the most frequent. Inflammation of the mucous membrane, resulting in adhesions, also produces it.

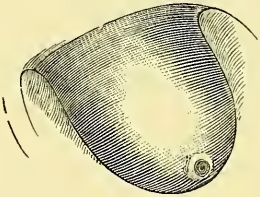

Fig. 155.

Conical Vaginal Portion (*Barnes*).

Atresia of Cervix (ἀ-τρῆσις, non-perforation), or occlusion of the canal, is rare as a *congenital* condition, and is due to the presence of a cap of tissue covering the os uteri. The canal is seldom, if ever, imperforate throughout its course. An incomplete transverse septum has been described in a few cases.[1]

It is more frequently *acquired*, and results from the following causes:—sloughing and cicatrisation after labour; cicatrisation after the application of caustics, and after amputation of the cervix; adhesion of granulations in cervical catarrh (after menopause), and round the base of tumours.

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[1] Budin—Progrès Médical, 1887.

The practical point for the practitioner to remember is that atresia may follow the repeated application of caustics and amputation of the cervix. It occurs also as part of the physiological changes which take place after the menopause. Twenty-eight per cent. of women above fifty years of age have atresia of the cervix (Hennig).

SYMPTOMS AND DIAGNOSIS.

Symptoms.

The symptoms found most frequently associated with these conditions are—

Dysmenorrhœa,
Sterility.

We say 'associated,' because the relation of the symptoms to the pathological condition is as yet not known. There is no subject in Gynecology round which more discussion has raged, and concerning which there are at present more abrupt differences of opinion.

Dysmenorrhœa.—Mackintosh, from a doubtful analogy between the menstruating uterus and the bladder, introduced dilatation with bougies as a treatment of dysmenorrhœa. The theory was that a stricture prevented the discharge of blood in the former case, just as it prevents a discharge of urine in the latter; and that the pain was due to uterine efforts to overcome obstruction. Sir James Simpson showed that stenosis could not be the only factor, since obstructive dysmenorrhœa might be equally present with a patulous cervix; it depended also on the amount of the menstrual discharge and the danger of its clotting while in the uterus, and may be absent where though the os is small the flow is scanty. Marion Sims took up the position that painful menstruation was almost wholly due to mechanical causes, and was the great exponent of what is known as 'the mechanical theory.' Thomas, Barnes, Schroeder and De Sinéty all accept this theory, more or less, in their handbooks of Gynecology. On the other hand, Matthews Duncan, in his recent lectures on Sterility, says he has never seen a pin-hole os in cases of dysmenorrhœa; and attributes the pain to irregular contractions of the uterus which have nothing to do with expulsion of its contents. Vedeler's recent investigations have shown that a small os externum is as common in patients without as in those with dysmenorrhœa. Emmet, at the discussion on Sims' Operation before the American Gynecological Society, characterised the mechanical theory of dysmenorrhœa as a myth; in his Gynecology, he says that, unless the flow is scanty, painful menstruation is accompanied by clots but that their formation does not depend upon obstruction.

Hitherto, conclusions have been drawn almost entirely from the condition of the uterus and cervix between the menstrual periods; and it will be evident from the foregoing how wide is the difference of opinion on the subject. It seems to us that valid conclusions can only be drawn from the condition of the cervix *during menstruation*, and that the diversity of opinion will remain until we have accurate knowledge on this point.

We have called the condition "Small Os Externum" instead of "Stenosis" advisedly; as the latter word implies that there is resistance to the outflow of blood, while the as yet scanty evidence rather seems to show that the canal becomes more patulous during menstruation than at any other time.

Relation of Stenosis to Sterility.

Sterility.—When we come to treat of sterility, we shall find that it is frequently associated with dysmenorrhœa. According to the statistics given by Matthews Duncan, as well as those by Marion Sims and Emmet, about one-half of cases of sterility suffer from severe dysmenorrhœa; and two-thirds of Vedeler's cases of dysmenorrhœa in married women were sterile. A narrow os externum, according to the mechanical theory, hinders the upward passage of the spermatozoa just as it retards the downward flow of the menstrual blood. This explanation is evidently open to the criticism that the spermatozoa are microscopic; and that, as Fritsch puts it, a drop of water will fall as easily through a ring of 2 cm. diameter as through a hoop of 100. It is, however, quite possible that a narrow os externum while not absolutely preventing conception may retard it: Müller, in enforcing the very important distinction between absolute and relative sterility, thinks that a contracted os may render conception more difficult, especially where the spermatozoa are scanty in the spermatic fluid. Thus, a counter-illustration to Fritsch's would be that where the drops are few there is more chance of catching them in a bowl than in a thimble. Although there is a general reaction against stenosis *per se* as a cause of sterility, yet the associated cervical catarrh is considered by the majority to play an important rôle through stagnation of the mucous secretion. It has not, however, been proved that a plug of mucus can be an effectual bar to the progress of spermatozoa, and catarrh is a very frequent condition in parous women.

A rigid condition of the cervix has, as already said, been frequently noted as present in cases of sterility. Matthews Duncan suggests that it operates through checking spontaneous dilatation of the cervix during coition.

In studying the complex question of sterility (*v.* Section IX.), the at first too obvious mechanical causes sink into insignificance as soon as we come in sight of the less obtrusive and more subtle physiological and vital considerations; and, after a careful survey of the literature, we come to the conclusion that any discussion of sterility in which mechanical considerations have a prominent place must be inadequate and will always be bootless.

DIAGNOSIS.

Diagnosis of Stenosis of the Cervix.

A history of dysmenorrhœa and sterility will lead us to suspect that one of these conditions of the cervix may be present. On vaginal examination, the finger recognises the conical shape and firm consistence of the cervix. In cases of small os externum, the first impression is that it is altogether absent; but more careful examination detects a slight depression. The speculum shows the appearance represented in figs. 154 and 155. The sound is passed with difficulty: but we must remember that difficulty in passing the sound is quite unreliable as a test of the canal's being relatively narrower at a given point; a sharp flexion, a projecting tumour or even a fold of mucous membrane may arrest the sound. Burton by passing the sound in six cases of dysmenorrhœa during the height of the pain made the interesting observation that the canal was more patent then than at any other period.

PROGNOSIS.

Prognosis.

This must always be guarded, as the etiological relationship between the conditions of the cervix described and these symptoms is still *sub lite*, and the results of our empirical treatment correspondingly uncertain.

TREATMENT.

The methods of treatment are—

A. Dilatation,
B. Division.

Dilatation for stenosis is carried out by passing graduated bougies, by sponge or laminaria tents, by forcible dilatation with instruments. Division is effected by the metrotome or by scissors. We here consider only dilatation for stenosis; its use for intra-uterine medication will be dealt with under the treatment of Endometritis.

A. Dilatation.

Treatment of Stenosis by Dilatation.

Sponge and laminaria tents were formerly used, but are now abandoned because of the dangers of septicæmia; at a recent discussion in the British Medical Association (1888) the consensus of opinion was entirely in favour of rapid dilatation, or division, as against the use of tents.

Dilatation by means of *graduated bougies* was brought into prominent notice by Mackintosh, who employed straight metallic bougies of different degrees of thickness. He passed first a small one not thicker than a probe, and then larger ones till the os was rendered quite patulous. This mode of treatment is specially recommended by Matthews Duncan.

A No. 9 bougie is the largest size which will pass through a virgin cervix. We have, therefore, to begin with one of smaller calibre, say 6 or 7, and go up to a No. 11 or 12, as the cervix must be over-distended to effect a cure. The successive numbers are passed at various sittings and not on the same day; so that the whole treatment requires about a week. Hegar's dilators (see p. 131) are also used in stenosis.

Various dilators with *expanding blades* have been devised. Fig. 156 shows the form used by Schultze. He dilates the cervical canal beforehand with laminaria; he then washes it out with a 2 per cent. solution of carbolic acid, as he attributes many of the serious consequences of forcible dilatation and incision to the absorption of the secretions. The dilator is now introduced, and the blades (which open antero-posteriorly) are forcibly separated. Ellinger has made a dilator so constructed that the blades remain parallel to one another while being separated; Goodell has had very good results from forcible dilation with this instrument both with regard to Dysmenorrhœa and Sterility. The dilator employed by Marion Sims is seen at fig. 157. Other forms have been recently introduced by Reid, Duke, and More Madden.[1]

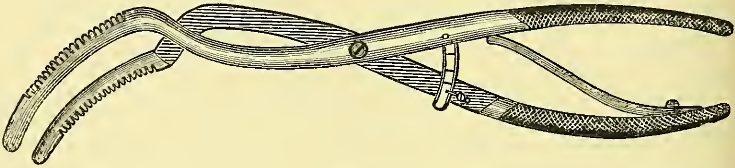

FIG. 156.
SCHULTZE'S DILATOR.

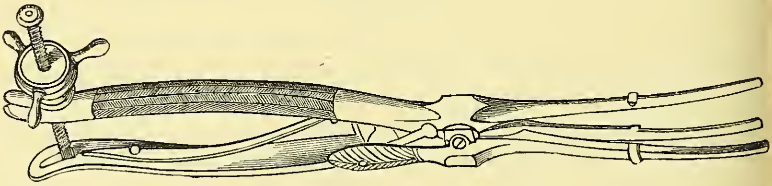

FIG. 157.
MARION SIMS' DILATOR (*Sims*).

B. Division.

Treatment of Stenosis by Division.

Division of the cervix with the knife was introduced by Sir James Y. Simpson. The instrument which he devised for this purpose was the *metrotome* represented at fig. 158.

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[1] See under "Instruments' in Index of Recent Gynecological Literature in Appendix.

Sir James Simpson's Metrotome.

It is a bistoury caché, with a single blade sharp on the outer edge which is unsheathed on compressing the handle. The screw on the handle regulates the extent to which the blade is to be protruded.

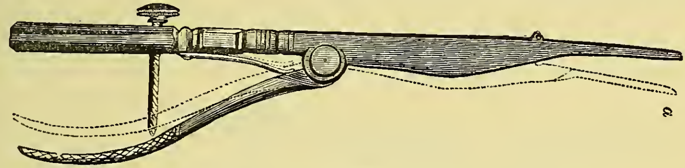

Fig. 158.
Sir James Simpson's Metrotome (*Sir J. Y. Simpson*). *a* shows position of blade when protruded.

The instrument was passed in till the point almost reached the os internum ; it was turned with the blade to one side, and then withdrawn, the handle being at the same time more and more compressed. The result was a lateral incision in the cervix, superficial at its upper extremity but becoming deeper as it passed downwards till at its base it completely divided the vaginal portion. The instrument was re-introduced and a similar incision made on the opposite side. The result of this operation was that the narrow circular os became an orifice with gaping lips. As Sir J. Y. Simpson points out, the nulliparous os is thus made to resemble in form the os of a uterus which has been pregnant; that is instead of being circular and small, it is made transverse and gaping (*cf.* figs. 159 and 160). That a patulous condition of the os and cervical canal greatly favours fertilisation is proved by the readiness with which conception follows abortion.

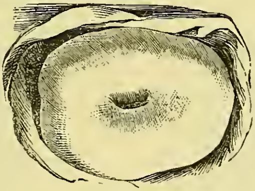

Fig. 159.
Nulliparous Os Uteri (*Sir J. Y. Simpson*).

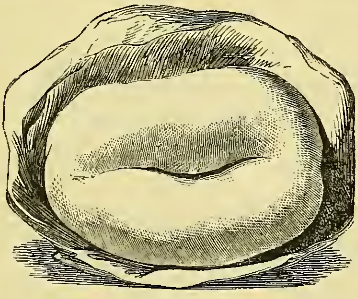

Fig. 160.
Parous Os Uteri (*Sir J. Y. Simpson*)

Other forms of metrotome have been introduced by Coghill, Greenhalgh, Savage, and Routh. Those of Greenhalgh and Savage are double-bladed, while that of Routh has the blades curved.

We are indebted to Marion Sims for substituting the *scissors* for the metrotome. The objections to the latter instrument are that we do not know how deep the incision is being made, nor whether both incisions are being made equally. The practitioner will find the scissors easier to handle than the knife. A pair of ordinary strong scissors will do, provided they are sharp and the cervix be firmly held with the volsella.

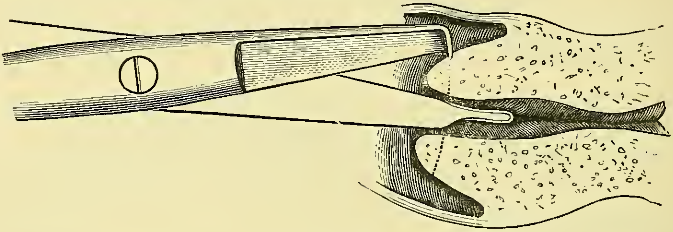

Fig. 161.
Showing the Bilateral Division of the Cervix, with Kuchenmeister's Scissors (*Barnes*).

The scissors of Kuchenmeister (fig. 103) and Hart (fig. 104) have this advantage, that the hook on the external blade prevents the cervix from slipping out as the section is being made.

Operation for Bilateral Division of Cervix.

The operation is performed as follows. The patient is placed semiprone. The Sims speculum is passed, and held by an assistant. This operation, as indeed all operations on the cervix or vagina, should be performed under continual irrigation from a vaginal douche. If the irrigation be not employed, the vagina should be thoroughly syringed beforehand with 1 to 40 carbolic acid solution. The anterior lip of the cervix is laid hold of with the volsella; the scissors are introduced, the straight blade being passed within the cervical canal; the point or hook of the external blade is carried to about one-third up the vaginal portion of the cervix (see fig. 161) and the section made. In many cases, all that is necessary is to divide the ring round the os externum; when this is divided the cervical canal is sometimes found to be dilated above it. Should hæmorrhage occur, some perchloride of iron is swabbed on the cut surface and a vaginal tampon of lint soaked in an antiseptic is applied.

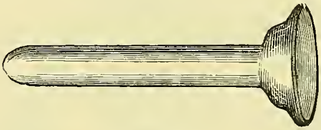

Fig. 162.
Glass Plug to keep the Cervix Patulous after division (*Thomas*).

One result of Emmet's work on laceration of the cervix has been to draw the attention of gynecologists to the fact that ectropion of the mucous membrane and secondary cervical catarrh may follow artificial division of the vaginal portion of the cervix. When this operation is necessary, we recommend, therefore, that it be done by three or four shallow notches round the margins of the os externum. As will be evident from what has been said under Symptoms, the scope of this operation is very limited unless we have recourse to it as a stage in treating cervical catarrh in a nullipara. We have described it minutely as the practitioner is more apt to be careless in minor operations.

Treatment after Bilateral Division of Cervix.

More important than the incision is the after-treatment. The patient must be seen on the following day, and every second day for a fortnight, and the finger passed in on each occasion to prevent union of the cut surfaces and dilate the cervical canal. To keep the canal open, Thomas recommends the use of a glass cervical plug (fig. 162) kept in position by a solid plate of the form of an Albert Smith pessary. Duke uses a spiral wire stem to keep the canal patulous after dilatation.

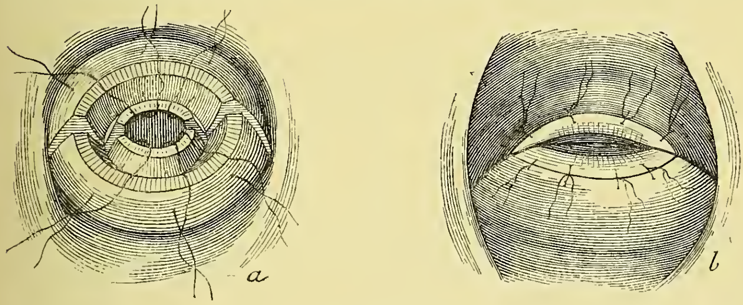

FIG. 163.

CONICAL EXCISION OF CERVIX. The figure to the left (*a*) shows the flaps and position of sutures; that to the right (*b*), the appearance of the os after the sutures are tied.

Excision of a portion of the cervix is also done with a view to convert the stenosed into a gaping os like that of a multipara (*v.* fig. 160). It is a favourite operation in Germany, was introduced by Simon and elaborated by Marckwald, and is known as the "kegelmantelförmige" ("cone-mantle-like," from the shape of the piece cut out) excision. The cervix is split into an anterior and a posterior lip, and a wedge-shaped piece cut out of each so that the cervix seen from the front has the appearance of fig. 163 *a*, while from the side it looks like fig. 168. The lips are then stitched separately—cervical mucous membrane being united to vaginal (fig. 163 *b*). We shall have to refer to this operation again in Chap. XXVIII.

Treatment of Atresia.

Atresia of the cervix is chiefly of importance in regard to the accumulation of menstrual blood or mucus above the obstruction. It is this which produces the Symptoms and calls for Treatment. It will be better to defer the consideration of these till we treat of Atresia Vaginæ (Section VI.).

CHAPTER XXVII.

ATROPHY OF THE CERVIX AND UTERUS: SUPERINVOLUTION.

Conditions under which Atrophy of Uterus occurs.

We meet with an atrophic condition of the cervix and uterus under four different conditions :—

1. As a congenital condition ;
2. Associated with certain constitutional affections, as phthisis, scrofula, chlorosis ;
3. In the puerperal uterus, as the result of superinvolution ;
4. After the menopause.

Should the student find on vaginal examination that the cervix is small and projecting only slightly into the vagina, and on bimanual examination that the body of the uterus is found with difficulty and is smaller than it should be, he must next ascertain which of the above-mentioned causes has produced the atrophy.

The history will enable him to form his diagnosis. With the *congenital condition* there is a history of amenorrhœa or scanty menstruation since puberty, of sterility if the patient has entered married life, and of hysteria and other disturbances of the nervous system which usually accompany imperfect development of the uterus. The *constitutional condition*, and especially the state of the blood and of the lungs, in other cases enables him to account for the condition of the uterus. Probably the small uterus found in chlorotic patients is a congenital condition, and not secondary to the constitutional state. If the atrophic condition be the result of *superinvolution*, there is a history of childbirth or abortion with non-appearance of menstruation after it. With regard to the *menopause*, the age of the patient is the chief guide ; we must remember the possibility of an early menopause, as early as at the age of thirty-five.

The only atrophic condition which we shall consider here is that occurring in the puerperal uterus as the result of superinvolution. To Sir James Simpson's description of this condition we are chiefly indebted.

SUPERINVOLUTION OF THE UTERUS.

LITERATURE. *Frommel*—Ueber puerperale Atrophie des Uterus : Zeits. f. Geburts. und Gynäk., Bd. vii., H. ii., S. 305. *Jaquet*—Ueber Atrophia Uteri : Berl. Beiträge zur Geburts. und Gynäk., Bd. ii., S. 3. *Johnson, T. J.*—Superinvolution of the Uterus Am. Gyn. Trans., 1883, p. 1064. *Klob*—Patholog. Anatom. der weib. Sexualorgane : Wien, 1864, S. 205. *Simpson, A. R.*—Superinvolution of the Uterus : Edin. Med. Jour., May 1883 (in which the literature is given to date). *Simpson, Sir J. Y.*—Morbid Deficiency and Excess in the Uterus after delivery : Selected Obstetrical and Gynecological Works, 1871, p. 595. On Superinvolution of the Uterus and Amenorrhœa : Diseases of Women, Edin., 1872, p. 597.

PATHOLOGY.

The uterus is small. Its external length may be reduced from the normal 3 to $1\frac{3}{4}$ inches. The walls are thin and flaccid, sometimes of a dense and fibrous consistence. The vaginal portion projects only slightly into the vagina, and may be almost flush with the vaginal roof. The os may be relatively patulous, or contracted so as only to admit a probe. The uterine cavity is reduced to $2\frac{1}{4}$, 2, or even $1\frac{1}{2}$ inches in length. The ovaries are atrophied, and sometimes show an increase of fibrous tissue in their structure. The accompanying specimen (fig. 164), described by Sir James Simpson, illustrates these points.

ETIOLOGY.

As to the frequency of this condition, A. R. Simpson found it present in 22 out of 1300 cases, that is in about 1·7 per cent.; Frommel estimates its frequency at 1 per cent. The reason why, in certain cases, the process of involution during the puerperium goes on till the uterine cavity is reduced to less than $2\frac{1}{2}$ inches in length is not known. A condition of transitory superinvolution—in which the superinvoluted uterus returns to the normal length again—has been observed. *Protracted Lactation* seems the most important cause (*Frommel*). We have seen this in two cases, and Chiari has also drawn attention to it. In some instances there is a history of great *loss of blood* at the confinement; A. R. Simpson found this in 10 out of his 22 cases, and in a case of this, reported by Whitehead,[1] the atrophic changes had progressed so far that no trace of a uterus was found on the most careful examination. In other instances *pelvic peritonitis* has occurred during the puerperium : this can produce, we know, atrophy of the ovary through binding it down with adhesions; and atrophy of the ovaries may lead to atrophy of the uterus. It is also associated with the *tubercular diathesis* (*Klob*).

The term superinvolution has also been applied to atrophy of the uterus following hypertrophy from causes other than pregnancy, *e.g.* submucous fibroids, and that following operations on the cervix,[2] but it is best to limit it to cases of atrophy after parturition.

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[1] British Med. Jour., Oct. 1872.

[2] Hardon describes it as following Emmet's operation : *Am. Journ. of Obstet.*, 1888, p. 1018.

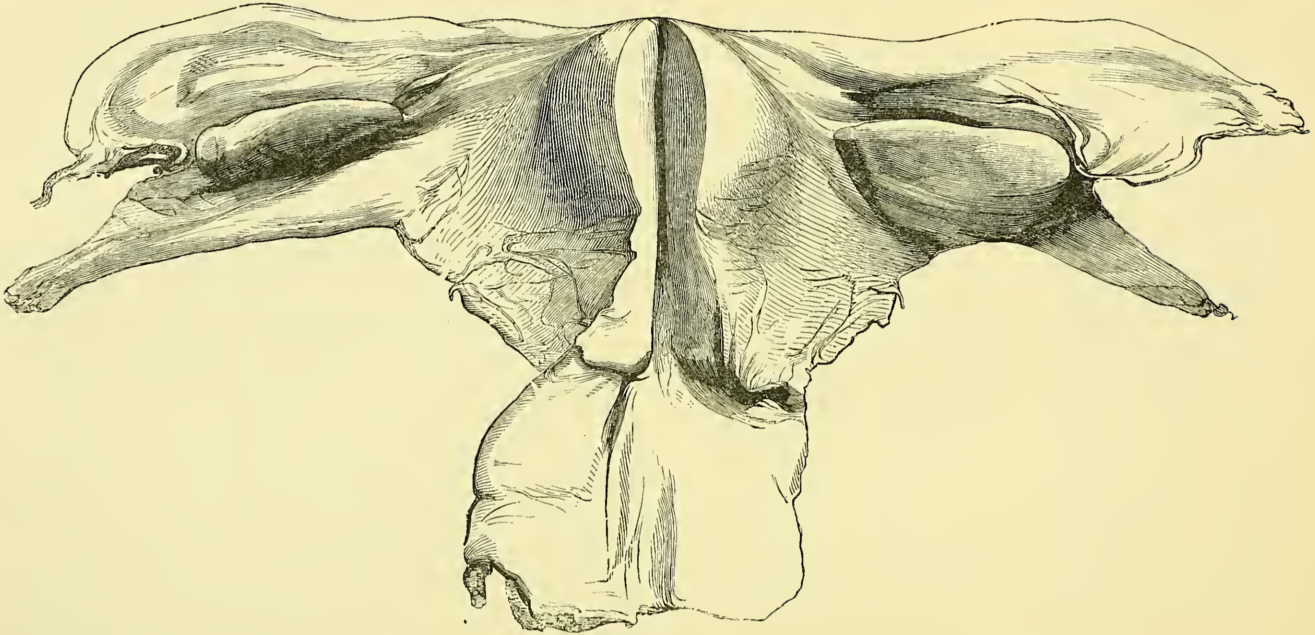

Fig. 164.

Preparation of Uterus and Ovaries in a case of Superinvolution, *ad naturam*. Weight of parts represented—one ounce, four drachms, twenty-five grains. Uterine cavity measures 1½ in. Thickness of posterior uterine wall (laid open in figure) ¼ in. Tissue of uterus, dense and fibrous. Ovaries atrophied, with increase of fibrous tissue and no appearance of Graafian vesicles. (*Sir J. Y. Simpson*)

SYMPTOMS.

Continued amenorrhœa is the symptom which leads the patient to seek advice. After she has ceased nursing, she expects the flow to return. It does not do so, however, even after months have passed. Pain in the back, weakness, and hysterical symptoms are sometimes present.

DIAGNOSIS.

The small cervix at once suggests what the condition is. We sometimes have difficulty in making out the uterus bimanually; here the examination per rectum, combined with the volsella, is useful. The best idea of the size of the uterus is gained by pressing the ball of the finger in the rectum against the isthmus of the uterus, and then moving the uterus upwards and downwards upon the finger which can thus estimate accurately its size; having done this, we make more traction on the uterus to bring it as far down as possible, and examine the ovaries.

The sound must be used with care, as it easily perforates the thin walls of the uterus. It does not pass into the uterus as far as the $2\frac{1}{2}$ in. knob.

Differential diagnosis must be made from—

Congenital malformation;
Congenital atrophy;
Senile atrophy.

PROGNOSIS.

This should always be guarded. The curability of the case depends, as Fordyce Barker has pointed out, on the condition of the Ovaries—a point, however, exceedingly difficult to determine. When the patient has the menstrual molimina and the menstruation though scanty still persists, we may hope for improvement even though the uterus is small.

TREATMENT.

From the unsatisfactoriness of treatment, such cases may, as a rule, be left alone. Iron and other constitutional remedies may be tried. When local treatment is called for, this consists in stimulating the uterus to hypertrophy by placing a foreign body in its cavity.

Mode of Introducing Intra-uterine Stem.

The galvanic intra-uterine stem pessary of Sir James Simpson was devised for this purpose. The stem is made in its upper half of zinc, in its lower half of copper; the bulb is also of copper. The stem should always be shorter than the uterine cavity by a $\frac{1}{4}$ of an inch; otherwise it may perforate the fundus. It is introduced as follows. The cervix is laid hold of with the volsella to draw it towards the vaginal orifice and to steady it. The stem is held with the bulb between the finger and thumb, and passed into the cervix for about an inch. If the vaginal orifice be too narrow to allow of this manipulation, the bulb is fixed on the end of a staff and thus carried in.

A glycerine plug is passed to keep the stem in position at first. The patient should keep at rest for one day after the stem has been introduced, and should be instructed to send at once if pain is felt in the pelvis; we have seen pelvic inflammation follow the introduction of a stem pessary.

Galvanism has also been used.

CHAPTER XXVIII.

HYPERTROPHY OF THE CERVIX: AMPUTATION.

LITERATURE.

Byrne—Amputation and Excision of the Cervix Uteri: Trans. Americ. Gyn. Soc., Boston, II. pp. 57 and 110. *Galabin*—Lond. Obst. Journ., Sept. 1878. *Goodell*—Clinical Notes on the Elongations of the Cervix Uteri: Am. Gyn. Trans., 1880, p. 268. *Hegar und Kaltenbach*—Operative Gynäkologie: Stuttgart, 1881, S. 445. *Huguier*—Memoires sur les Allongements Hypertrophiques du Col de l'Uterus: Paris, 1860. *Leblond*—Operative Gynécologie: Paris, 1878. *Marckwald*—Ueber die kegelmantelförmige Excision der Vaginalportion, etc.: Archiv f. Gyn. Bd. viii. S. 48. *Müller*—Die Amputatio Colli Uteri: Zeitschrift für Geburt. und Gyn. Bd. ix. S. 178. *Schroeder*—Charité-Annalen, 1878. Zur Technik d. plast. op. am cervix uteri: Zeitschrift für Geburt. u. Gyn., Bd. iii. S. 419; Bd. vi. Hft. 2, S. 218. *Simon*—Monatsch. f. Geburtskunde, xiii. S. 418. *Sims, Marion*—Uterine Surgery, 1866. *Stratz*—Ueber einseitige Hypertrophie des untern Cervicalabschnitts: Zeits. für Geb. und Gyn., Bd. XII., S. 229. See also Index of Recent Gynecological Literature in the Appendix.

HYPERTROPHY of the whole uterus occurs in two forms:—

1. Hypertrophy of the muscular tissue—in pregnancy;
2. Hypertrophy of the connective tissue—in subinvolution and chronic metritis, both of which will be considered under Chronic Metritis (Chap. XXXII.).

Hypertrophy of the cervix alone calls for special notice here.

HYPERTROPHY OF THE CERVIX.

Under this head we consider two conditions:—

A. Hypertrophy limited to the vaginal portion, which is a distinct *primary* lesion;

B. Hypertrophy of the supra-vaginal portion, which is usually associated with hypertrophy of the body of the uterus; this occurs in prolapsus uteri and is probably *secondary* to that condition.

A. HYPERTROPHY OF THE VAGINAL PORTION.

Hypertrophy of Vaginal Portion.

Pathology.—The characteristic of this condition of the cervix is a great increase in length affecting it equally all round [1] (fig. 166). The mucous membrane and the subjacent tissue are not thickened, so that the diameter of the cervix is not much increased. As the result of the increase in length, the conical apex of the cervix comes to lie immediately behind the hymen and may protrude through the vaginal orifice (fig. 165). The os externum is often small.

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[1] Only one case of unilateral hypertrophy in a nullipara could be found by Stratz in the literature—a case recorded by Huguier. Partial hypertrophies are less rare in multiparæ and will be referred to under Laceration of the Cervix.

Etiology.—This condition is a true hypertrophic growth; it is not very common and the cause of it is unknown. As it occurs in the virgin, it is probably congenital. Sometimes it does not attract attention till the patient enters married life, when it produces as a rule sterility because the form of the cervix interferes with conception.

The cervix is frequently *thickened* as the result of chronic inflammation consequent on its laceration in childbirth; this is not a true hypertrophic growth, and will be considered under Laceration of the Cervix (Chap. XXIX.).

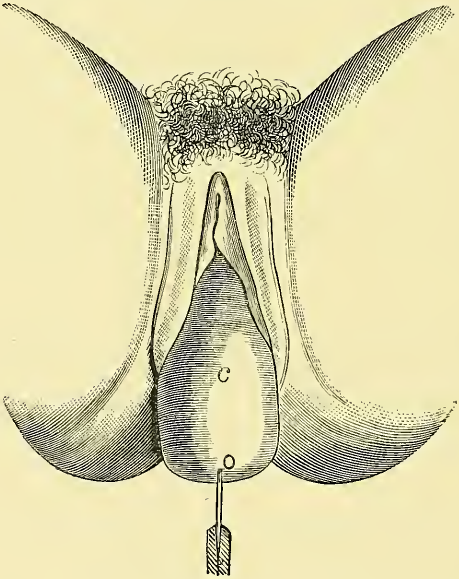

Fig. 165.
Hypertrophied Vaginal Portion *c* protruding through the Vulva. The Sound has passed very far into the small os *o* (*Schroeder*).

Symptoms.—The symptoms are due to the presence of the hypertrophied cervix in the vagina. There is bearing-down as in prolapsus uteri, irritation of the mucous membrane of the vagina and consequent leucorrhœa, discomfort on walking about and on rising suddenly. If the cervix protrude beyond the vulva, ulceration of its mucous membrane and excoriation are produced.

Diagnosis.—This presents no difficulty. The fornices are found in their normal position on vaginal examination (see fig. 166), the fundus uteri at its normal height in the pelvis on bimanual examination. These two clinical facts indicate that the low position of the apex of the cervix is not due to a descent of the fundus but to a hypertrophy of the cervix, and that the hypertrophy of the cervix is limited to the portion which projects into the vagina (*cf.* fig. 166 with fig. 174 and fig. 175). The sound may pass five inches or more into the cervical canal; as the patient is usually a nullipara and the abdominal walls therefore firm, it facilitates the Bimanual to do it with the sound in the uterus. The combined recto-vaginal examination shows that the uterus, above the vagina, is of normal length.

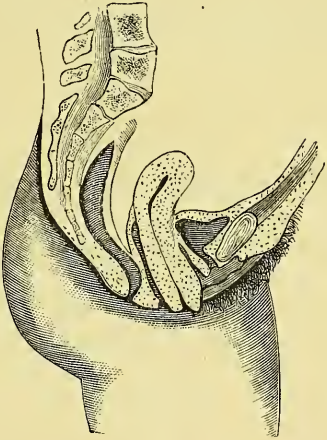

FIG. 166.

HYPERTROPHY OF VAGINAL PORTION OF CERVIX. Neither fornix is obliterated (*Schroeder*). Section of Pelvis seen in fig. 165.

Treatment.—This consists in amputation of the cervix which is the only course open to us, because the hypertrophy will not diminish but rather increase. Amputation is performed by three methods:—

1. Scissors or knife,
2. Ecraseur,
3. Galvano-caustic wire.

The successive improvements in the method of amputation *with the knife* may be thus tabulated; by Marion Sims was made the advance of covering the stump with mucous membrane.

(1.) *Old* method. Circular amputation; raw surface touched with caustic or cautery; healing by granulation.

(2.) *Sims'* method. Circular amputation; vaginal mucous membrane stitched to vaginal mucous membrane; healing partly by first intention (fig. 167).

(3.) *Hegar's* method. Circular amputation; vaginal mucous membrane stitched to mucous membrane lining cervix (figs. 170 and 172); healing by first intention.

(4.) *Simon and Marckwald.* Flap amputation by wedge-shaped excision of lips separately (figs. 163 and 168); vaginal mucous membrane stitched to that lining cervix on each lip (fig. 170); healing by first intention.

The supra-vaginal amputation will be considered under operations for cancer of the cervix.

The best method of performing the amputation is to split the cervix by a transverse incision into an interior and posterior lip; then amputate each lip separately making the line of amputation wedge-shaped; finally bring together the projecting flaps of vaginal and cervical mucous membrane with wire sutures.

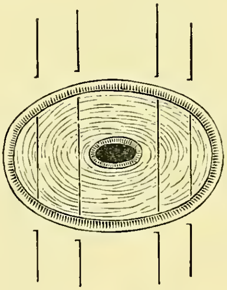

FIG. 167.

SIMS' METHOD OF PASSING THE SUTURES. Vaginal mucous membrane stitched to vaginal (*Sims*).

Amputation of the Cervix for Simple Hypertrophy.

The operation. The instruments required are the following:—

Antiseptic douche,
Sims' speculum,
Spatulæ,
Volsellæ,
Straight needles fixed on handles,
Silver wire,
Bistouries,
Dissecting forceps,
Blunt hook,
Scissors,
Artery forceps,
Small curved needles and needle holder.

A. R. Simpson operates as follows. The patient is placed in the lithotomy posture. Continued irrigation with a 2 p.c. solution of carbolic is employed. The cervix is drawn down with volsella. An india-rubber ring may be passed over the volsella on to the cervix and placed so as to constrict the cervix just below the fornices (fig. 169) to control hæmorrhage. The cervix is pierced in the middle line from below with a straight needle on a fixed handle. A straight needle passes more easily through the dense tissue of the cervix ; if the cervix does not project sufficiently through the vulva to allow of the straight one being used, a curved one is required. When the point of the needle projects as far as the eye, this is threaded with a *long* wire suture and then drawn back (fig. 169, *MN*). A similar thread is carried through on either side of the middle line so that the cervical canal is pierced with three long sutures, one in the middle of it, and one at each side of it. The cervix is now split horizontally with the knife or scissors so as to divide it into an anterior and posterior lip ; this horizontal section is carried as far as the sutures, so that they are exposed at the bottom of the incision. We now hook them up in turn and drag the loop of each down through the wound (fig. 169, *mn*). Each loop is then divided ; the three sutures are thus converted into six—three through the base of each lip. A portion of the anterior lip is excised along the line 1, 2, 3. The sutures are now used to bring together the margins of this amputation. The posterior lip is next treated in the same way. Additional sutures are put in on each side to close the side walls of the cervix (fig. 170, *x* and *y*). When the cervix is not unusually thick, these lateral sutures are passed as in fig. 170 ; but when the cervical walls are thick, it makes a neater stump to bring these sutures also out through the cervical canal and unite vaginal to cervical mucous membrane all round (see fig. 172).

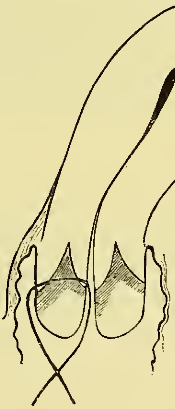

FIG. 168.

MARCKWALD'S METHOD OF SPLITTING THE CERVIX into an anterior and a posterior lip and then uniting cervical to vaginal mucous membrane (*Schroeder*).

The peculiarity of this method of operating is, that the sutures are introduced before the knife is used. The advantages of this are the following :—it is easier to pass the needle through the dense tissue when the cervix is fixed with the volsella ; the sutures serve as a means of traction when the portion grasped by the volsella has been cut away ;

and we can ligature the flaps immediately after the lip has been amputated and thus check hæmorrhage.

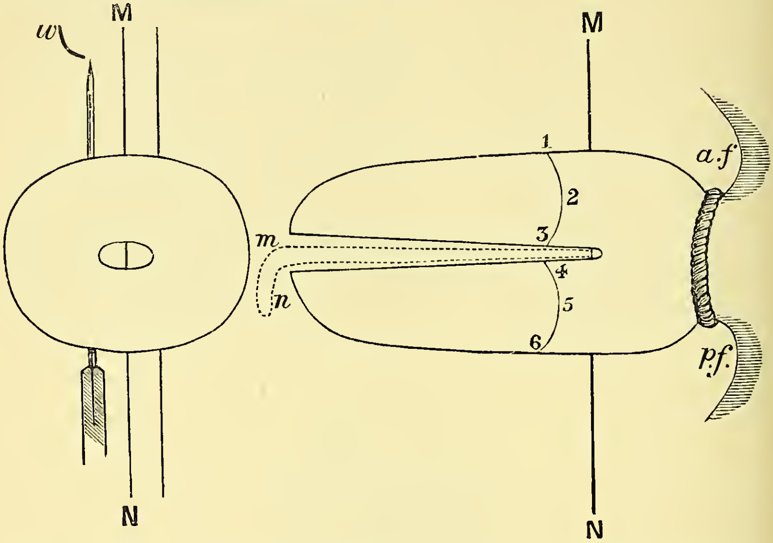

Fig. 169.

Diagram of Amputation of Cervix. To the right is seen the cervix with the ring constricting it, a suture *MN* in position, the cervix split, and the line of amputation marked 1 to 6; *a.f.* anterior and *p.f.* posterior fornix. To the left is seen the cervix, in cross-section; two threads are passed and the needle carried through but not yet threaded with the wire *w*.

The appearance of the stump after the sutures have been twisted is seen at fig. 171. The ends are left long enough to protrude clear of the vulva; the free ends of the same suture are twisted together to keep them separate from the others; finally, all the ends are wrapped in a

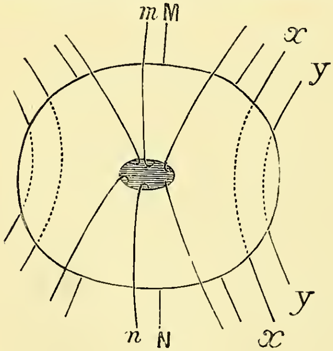

Fig. 170.

The Suture *MN* has been divided and the halves brought down the canal as *Mm*, *Nn*; the lateral ones also. *x x* and *y y* are additional side Sutures.

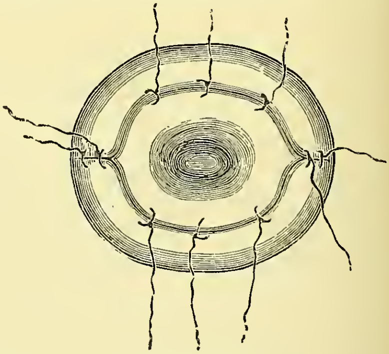

Fig. 171.

Appearance of Stump of fig. 170 when Sutures are twisted up.

piece of lint to prevent their fretting the labia. Catgut is being used now instead of wire in operations on the cervix to obviate the necessity of removal, which is always a disagreeable and sometimes a painful operation; it must be strong, as some force is required in tying it tight to secure coaptation of surfaces.

Mode of removing Sutures.

Removal of Silver-wire Sutures.—The sutures are removed in a week's time. The patient is put in the Sims position and the Sims speculum passed. Slight traction is made on a suture, and if the twisted knot is visible, we clip the wire with the wire scissors. Generally we find the knot is embedded in tissue; in which case the rake (fig. 173) is used to hook up the loop. In snipping the loop we place one blade of the scissors under it, and then press the tissue back from the wire so as to divide the loop as far away from the knot as possible.

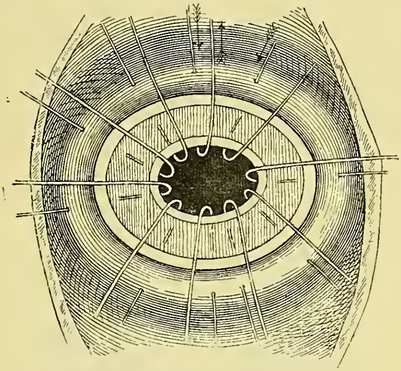

FIG. 172.
HEGAR'S METHOD OF STITCHING THE CERVIX after the circular amputation (*Hegar u. Kaltenbach*).

Amputation with Ecraseur or Galvano-caustic wire.

Amputation with the *Ecraseur* or with the *Galvano-caustic wire* is not such a neat method of operating as with the knife. Further, there is liability to closure of the cervical canal through cicatrisation; this may be prevented by introducing a stem pessary after amputation. The galvano-caustic wire is recommended by Barnes, Thomas, and others; its use has been followed with remarkably good results in the hands of Byrne of Brooklyn, whose valuable paper on this subject should be consulted.

FIG. 173.
POINT OF RAKE; although finely made, it should be blunt. (½).

The method of using the ecraseur and galvano-cautery will be described under amputation of the cervix for carcinoma (see Chap. XLII.).

With the galvano-caustic wire we must see that the wire does not *slip downwards*, and thus "scalp" instead of amputating the cervix. The fact that the galvano-cautery diminishes hæmorrhage is of no advantage in amputating the hypertrophied cervix. The use of the india-rubber ring makes this a bloodless operation; and the introduction of the sutures in the way described minimizes the danger of hæmorrhage where the ring is not employed.

B. HYPERTROPHY OF THE SUPRA-VAGINAL PORTION.

Diagnosis of Hypertrophy limited to supra-vaginal portion of Cervix.

The existence of hypertrophy limited to the supra-vaginal portion of the cervix and not affecting the body of the uterus cannot be determined by *clinical* examination alone. The obvious reason is that we have no means of ascertaining in a case of hypertrophy where the precise upper limit of the cervix lies. The position of the os internum cannot be learned from the sound, and the distance to which the utero-vesical pouch of peritoneum descends can only be ascertained on post-mortem examination. We cannot affirm, therefore, that the hypertrophy is limited to the supra-vaginal portion of the cervix and that it does not affect the body of the uterus as well.

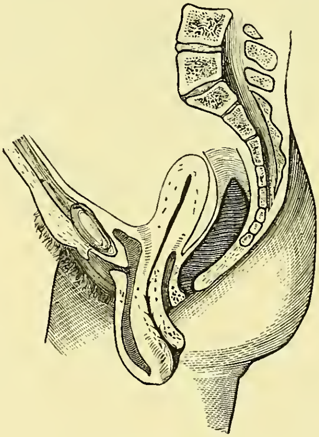

FIG. 174.
HYPERTROPHY OF INTERMEDIATE PORTION OF CERVIX. The anterior fornix is obliterated (*Schroeder*).

In the present state of our knowledge it is impossible to say whether this hypertrophy is primary or secondary. We believe that in the great proportion of cases it is secondary to prolapsus uteri. It has also been described as an exceptional occurrence in the early months of pregnancy.[1]

By French and by many German gynecologists, however, hypertrophy of the supra-vaginal portion of the cervix is considered a distinct primary lesion. Huguier first drew attention to the increase in the length of the uterine canal in cases described as prolapsus uteri; he affirmed that the fundus uteri always remained in its normal position, and that the os externum came to lie outside the vulva *because* the cervix had increased in length; this hypertrophied condition of the cervix was occasioned by a prolapse of the vaginal walls which made traction on the cervix, and thereby stimulated it to increased growth.

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[1] By Martin—Berliner Gesellschaft f. Geb. u. Gyn. 1880.

Three forms of Cervical Hypertrophy.

By these gynecologists, three forms of cervical hypertrophy are described according to the portion of the cervix which is hypertrophied. The division of the cervix into three portions—a vaginal, an intermediate, and a supra-vaginal portion—has been already described (see page 16). The vaginal portion is limited superiorly by the insertion of the anterior fornix; the intermediate by that of the posterior fornix; the supra-vaginal by the os internum. Hypertrophy of the vaginal portion is characterised by the *persistence of both* fornices in their normal position; it has been already described (see fig. 166). In hypertrophy of the intermediate portion the posterior fornix remains, while the *anterior is obliterated* (see fig. 174). In hypertrophy of the supra-vaginal portion *both anterior and posterior fornices are obliterated* (see fig. 175).

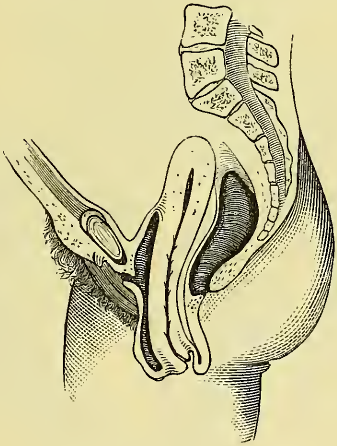

FIG. 175.

HYPERTROPHY OF SUPRA-VAGINAL PORTION OF CERVIX. Both fornices are obliterated (*Schroeder*).

In the accompanying preparation (fig. 176), described by Barnes, the elongation affects both uterus and cervix—if we take the utero-vesical pouch of peritoneum as indicating the position of the os internum. Similar specimens are figured and described by Winckel (Die Pathologie der weiblichen Sexual-Organe, Tafel XIX*a*), and by Gallard (Annales de Gyn. XXIV., p. 219).

Treatment.—While hypertrophy limited to the vaginal portion of the cervix is very rare, that affecting the whole cervix and usually associated with prolapsus uteri is a common condition, and it was for it that the various modes of amputating a portion of the cervix described at p. 281 were introduced.

Conoid Amputation of Hypertrophied Cervix.

Huguier, who first exactly described supra-vaginal hypertrophy, introduced the *conoid amputation.* One incision is made from the posterior fornix obliquely upwards and forwards as far as the cervical canal; a second is made from the anterior fornix upwards and backwards to meet the latter; by this means a wedge-shaped or conical piece of the supra-vaginal portion of the cervix is removed.

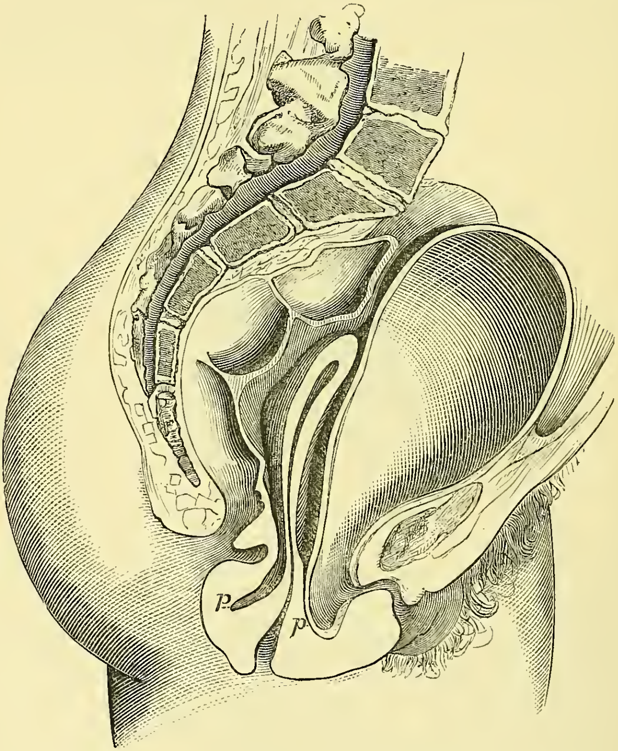

Fig. 176.
Prolapsus Uteri with Cervical Elongation (*Barnes*); *p*, *p*, peritoneum.

Flap Operation.

The flap operation already described, however, gives the best stump. In amputating for supra-vaginal hypertrophy, the *relations of bladder and peritoneum* of the pouch of Douglas require to be considered. The bladder invariably descends for a varying distance in relation to the front of the hypertrophied cervix. The peritoneum of the pouch of Douglas, inasmuch as it lines the upper part of the posterior vaginal wall, will, when that wall is everted, dip down alongside of the hypertrophied cervix. If the posterior fornix is not obliterated, the peritoneum will not descend alongside of the protruding cervix.

The relations of the bladder and peritoneum are represented diagrammatically in fig. 177. The line of reflection of the posterior vaginal wall on to the cervix indicates how much is vaginal portion, and by passing the needle below that line we keep clear of the pouch of peritoneum. The sound passed into the bladder will show us how far down that organ comes, and the needle is brought out an inch below that point.

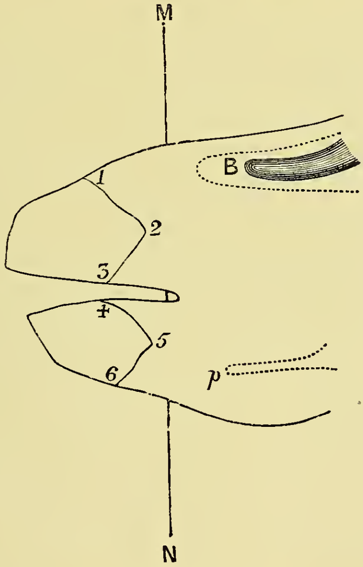

FIG. 177.

AMPUTATION OF HYPERTROPHIED CERVIX IN PROLAPSUS UTERI. *B* sound in bladder; *p* peritoneum of pouch of Douglas. The sutures are passed as *M N*, and the cervix split laterally, so as to form an anterior lip, which is amputated along lines 1, 2, 3, and a posterior lip amputated along 4, 5, 6.

The steps of the operation are the same as in the former case.

The peritoneum of the pouch of Douglas has been frequently cut into without bad results following, so that many operators regard this as an accident of little importance.

CHAPTER XXIX.

LACERATION OF THE CERVIX AND ITS CONSEQUENCES.

LITERATURE.

Baer—Analysis of Twenty-seven Operations for the Restoration of the Lacerated Cervix Uteri, with special reference to the effect on sterility and labour: Amer. Jour. Obstet., 1883, pp. 295, 852. *Breisky*—Wiener med. Wochenschrift, 1876, Nos. 49-51. Also, Prager med. Wochenschrift, 1876, No. 18 and 1877, No. 28. *Czempin*—Risse des Cervix Uteri ihre folgen und operative Behandlung: Zeit. für Geb. und Gyn., Bd. XII., S. 287. *Desvernine*—Thèse de Paris, 1879. *Dudley*—New York Med. Jour., Jan. 1878. *Emmet*—Surgery of the Cervix: Am. Jour. of Obst., Feb. 1869; ibid., Nov. 1874. American Practitioner: Indianapolis, Jan. 1877. Principles and Practice of Gynæcology, p. 440: Philadelphia, 1884. *Eustache*—La Trachélorrhaphie ou opération d'Emmet: Archiv. de Tocolog., 1884, p. 684. *Goodell*—Notes of one hundred and thirteen cases of operation for laceration of the cervix: Am. Journ. of Obst., Jan. 1882. *Hegar*—Operative Gynäkologie, S. 538: Stuttgart, 1881. *Hewitt, Graily*—Clinical Lecture on Laceration of the Os and Cervix Uteri, etc.: Brit. Med. Journ., 1886, I. p. 1. *Houzel*—Note sur l'Operation d'Emmet ou Trachélorraphie: Annal. de Gyn., XXX., 241 and 351. *Howitz*—Gynäkologiske og. Obstetriciske Meddelelser, Bd. I., Heft 3. *Johnson*—Trachelorrhaphy: Amer. Jour. Obstet., 1884, p. 539. *Kaltenbach*—Ueber tiefe Scheiden-u. Cervicalrisse bei der Geburt: Zeitschrift f. Geb. u. Gyn., Bd. II., S. 274. *Klein*—Prager med. Wochenschrift, 1878, No. 24. *Lee*—The Proper Limitations of Emmet's Operation: New York Med. Jour. Sept. 1881. *Macdonald, Angus*—The Causes, Results, and Treatment of Laceration of the Cervix: Ed. Med. Jour., July 1882. *Mundé*—Am. Jour. of Obst., Jan. 1879; Death after Trachelorraphy, New York Med. Jour., 1883, p. 332. *Murphy*—Observations on the effects of Trachelorrhaphy on Fertility and Parturition: Amer. Journ. of Obstet., Jan. 1883. *Nieberding*—Ueber Ectropium und Risse: Würzburg, 1879. *Noeggerath*—Cervixrisse und Erkrankungen der Gebärmutter: Berl. klin. Wochenschr., 1887, No. 41; and (for Discussion) Archiv f. Gyn., Bd. XXXI., S. 469. *Olshausen*—Zur Pathologie der Cervicalrisse: Centralbl. f. Gyn., 1877. Nr. 13. *Pallen*—St. Louis Med. and Surg. Jour., May 1868; Richmond and Louisville Med. Jour., 1874: British Med. Jour., May 1881. *Park*—Trachelorrhaphy: Edin. Med. Jour., XXXIII., II., p. 1130. *Playfair*—Trachélo-raphé: Lond. Obstet. Trans., 1883, and Medical Times and Gazette, 1885, I. 340. *Roser*—Das Ectropium am Muttermund: Arch. f. Heilk. II. Jahrg., 2 H., 1861. *Ruge u. Veit*—Zur Pathologie der Vaginalportion; Stuttgart, 1878. *Sänger*—Ueber die klinische Bedeutung der Cervixrisse: Centralb. f. Gyn., Bd. XII., S. 441. *Simpson, Sir J. Y.*—Edin. Jour. of Med. Science, 1851, p. 152. *Spiegelberg*—Ueber Cervicalrisse, ihre Folgen u. ihre operative Beseitigung: Breslauer ärtz Zeitschrift, 1879, No. 1. *Van de Warker*—Etiology of Lacerations: Am. Journ. of Obst., Jan. 1882. Thirty-one operations for Repair of Laceration of the Cervix Uteri: ibid., July 1883. *Vulliet*—Douze cas d'operation de Trachélorrhaphie: Archiv. de Tocolog., 1884, p. 1000. *Wells, B. H.*—Possible Dangers of Trachelorrhaphy: Amer. Jour. Obstet., 1884, p. 561. Also, The Etiological Relation of Cervical Laceration to Uterine Disease: Amer. Jour. Obs., 1888, p. 257. *Zinke*—Emmet's Operation: Phil. Med. Reporter, Aug. 1885. See Index of Gynæcological Literature in the Appendix for recent cases of the Operation.

Introductory.

The student will not have gone far in the clinical study of Gynecology without being surprised at the large number of patients who refer the commencement of their illness to a confinement or miscarriage. They come complaining of various ailments—a weak back, pain in the side, white discharge, losing too much at the monthly time, or general unfitness for work. On physical examination, he finds a variety of conditions—a fissured and thickened velvety cervix, thickenings in the lateral fornices or behind the uterus often displacing it by traction, and the uterus itself enlarged. We do not mean that all of these are present in one case, but that one or more of them may be; nor is any one symptom invariably connected with one lesion. He asks himself why labour is so often the starting-point of female complaints; and one important reason, though by no means the only one, is that the tear of the cervix in labour literally opens the door to a variety of lesions. Cervical catarrh is favoured, if not started (as Emmet says), by the split condition of the cervix; the raw surface has admitted septic matter which leads to chronic inflammation of the parametrium with all the changes in the train of parametritis; and sub-involution is kept up (if not directly by the tear, as Emmet holds) indirectly by the consequent parametritis which Freund has shown to affect the venous and lymphatic circulation in the uterus. It is impossible to consider laceration of the cervix separate from the results which in the great majority of cases follow, and hence this chapter deals with "Laceration of the Cervix and its Consequences." Many of these latter being distinct lesions in themselves, will be treated of separately in the following chapters and only referred to here in their relation to laceration as an antecedent.

Historical.

For the recognition of laceration of the cervix as a distinct and important lesion we are indebted to the genius of Emmet of New York, who was the first to insist on its clinical significance and elaborate an operation for its treatment.

J. H. Bennet of London had previously described the changes produced in the cervix by its laceration in labour, unfortunately attributing them to a process of ulceration. Roser of Marburg had described the pathology of the condition; but its importance as a factor in uterine disease was brought into notice by Emmet's first paper which was published in 1869, seven years after he had introduced his operation. Emmet's views as to the importance of lacerations of the cervix have given rise to a great deal of discussion; and their significance is a *quæstio vexata* in Gynecology, which has been revived in the last two years through a paper by Noeggerath in 1887.[1] From a comparison of fifty gynecological cases in which laceration was present with another fifty in which it was absent, he concludes that it has no effect on fertility, on the length or position of the uterus, cervical catarrh or ectropion, or disease of the uterus generally. His paper has given rise to considerable discussion in Germany, America, and this country; and it has been shown [1] that Noeggerath's method of inquiry is in several respects fallacious, and that the clinical evidence proves that his extreme position is indefensible.

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[1] Read in the Gynecological Section of the Versammlung deutscher Naturforscher und Aerzte in Wiesbaden. His paper and the others referred to in the text are given in the Literature.

PATHOLOGY.

Seat, form, and extent of laceration.

The commonest *seat* of the laceration is to the front and left [2] side of the cervix, probably because the long diameter of the child's head is most commonly in the right oblique diameter of the pelvis, and the thicker end of the wedge is to the front. The next in frequency is a double laceration—to the front and left, and to the back and right sides. Less frequently is the laceration at either end of the left oblique diameter. We have found lacerations to the front and right side in cases where the head presented right occipito-anterior. The *form* of the laceration is various—single (see fig. 178), double (see Plate XII., fig. 2), or multiple (see fig. 179). The *extent* of the laceration varies, from a mere indentation of the ring of the os externum to a gaping fissure separating the lips of the cervix up to the vaginal fornices. Occasionally it extends into the roof of the vagina,[3] and is marked by a cicatricial band drawing

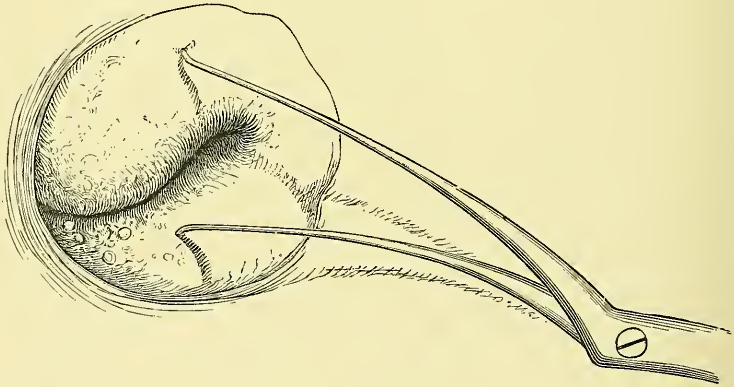

FIG. 178.

SINGLE LACERATION. The flaps are held apart with a double tenaculum (*Emmet*).

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[1] See the papers by Sänger, Park, and Wells given in the Literature.

[2] According to Emmet and Spiegelberg; Klein and Czempin found right-sided laceration more frequent.

[3] Czempin, in an extremely interesting paper on cases of laceration of the cervix observed in Martin's Clinique at Berlin, draws especial attention to these tears extending into the fornix which he describes as "Cervix-Laquearrisse." They are not infrequent (having been present in sixty-eight out of his two hundred and eighty-seven cases), usually unilateral, and more frequent with single than with double tears of the cervix itself. Their symptoms are more marked, due to the changes in the parametrium.

the cervix to one side; we have noticed this in forceps cases, specially when the forceps had been applied before the os was dilated.

Results. Among the pathological conditions which are the *consequences of laceration* are the following. One result is that the mucous membrane of the cervical canal is exposed, and the occurrence of *cervical catarrh* favoured (*v.* Cervical Catarrh). The submucous tissue is also thickened and the whole cervix thus hypertrophied.[1] With these inflammatory changes there is *eversion* of the lips of the cervix, although this is sometimes counteracted by the formation of cicatricial tissue in the cleft.

Another consequence is *cellulitis;* frequently we find, on the same side as the laceration, a localised cellulitis in the shape of a distinct deposit, or a tense condition of the utero-sacral or broad ligament, accompanied with tenderness on pressure through the fornix. This tenderness, as well as the constant pain complained of in the side, is probably due to changes in the sympathetic plexus in the connective tissue already referred to under Parametritis. *Subinvolution* of the uterus is also frequently present; there is a formation of cicatricial tissue, which compresses the veins and lymphatics and leads to passive congestion and hypertrophy. The compression of the vessels seems sometimes to have an opposite result, leading to atrophy through stoppage of nutrition.

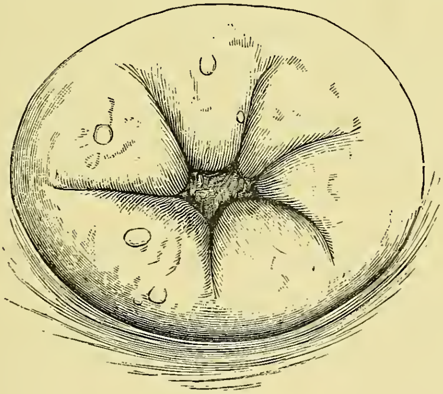

FIG. 179.
MULTIPLE OR STELLATE LACERATION (*Emmet*).

ETIOLOGY.

Frequency of laceration. A laceration of the cervix will be found, according to Emmet's statistics, in 32·8 per cent. of parous women; according to Wells, who takes the average of all the various authorities, in 32 per cent. Though it is obvious that lacerations may be produced and heal again so that all trace of them escapes notice, we cannot affirm that the cervix is lacerated with every first full-time labour; but when present, a laceration of the cervix (if we exclude the possibility of the cervix having been divided artificially) *is the most reliable diagnostic of a former parturition.* It must, however, be remembered that a divided condition of the cervix with ectropium of the cervical mucous membrane has been described as a *congenital* condition by Fischel and Küstner; in such cases, the everted mucous membrane does not become much altered and retains the arbor vitae.

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[1] Partial hypertrophies of such a size as almost to form a tumour sometimes, but very rarely, occur. Stratz describes three cases, in one of which the tumour weighed 2 lbs. (*Zeitsch. für Geb. und Gyn.*, Bd. xii., S. 229.

We should have expected that lacerations would be more readily produced in a rapid labour, in which the os had not time to dilate; Emmet and Pallen, however, have found that they are more commonly the result of tedious labours. Spiegelberg blames early rupture of the membranes done to hasten labour; while Klein finds them most frequent where there is a short interval between rupture of the membranes and delivery of the child, as also where the child is heavy.

Barker and Mundé both draw attention to the fact that they are less common among the wealthy than among the poor. This is probably explained by the better care and longer rest in the puerperium which the former enjoy.

Produced during pregnancy.

Even *during pregnancy*, according to Nieberding, fissuring of the cervix with ectropium is produced. He examined the cases admitted to the lying-in hospital at Wurzburg at three periods—during pregnancy, as shortly as possible after delivery, and on dismissal. Only in 26 per cent. of the primiparæ examined (thirty-eight cases) was the appearance of the cervix normal during pregnancy; in all the others more or less ectropium was present. In 50 per cent. there were in addition small fissures, which made the os stellate or irregular in form.

SYMPTOMS.

Symptoms of laceration.

It is very important to know what symptoms are referable to a lacerated cervix. Those who revel in operative treatment ascribe every pathological condition in the uterus to lacerations, while others altogether deny that they have any pathological significance.

We advance the following considerations in regard to the symptoms.

1. Lacerations of the cervix *in themselves produce no symptoms.* Hæmorrhage may arise at the time of production, but is not a symptom of the persistence of the laceration.

2. Other pathological conditions arise secondarily as the result of the laceration, of which the most important are cervical catarrh and cellulitis; cicatricial tissue in the cleft produces reflex nervous symptoms.

We sometimes find a well-marked laceration by chance, as it were, the patient having had no symptoms referable to a pelvic cause.

Frequently she complains of *leucorrhœa* and symptoms common to pelvic or uterine inflammation. *Menstruation* is often irregular, increased in 50 per cent. according to Emmet's statistics; this is in many cases due to subinvolution. *Sterility*, when present, is probably due to the accompanying catarrh; and the *tendency to abortion*[1] to the secondary changes in the uterus or parametrium. *Neuralgia* is sometimes present, which may show itself locally in excessive tenderness to touch at the seat of laceration and has been compared to the sensitiveness present in toothache. In other cases it has taken the form of neuralgic pain in the pelvis generally, often in the groin and extending down the leg, or sympathetic neuralgia elsewhere. Emmet and others record cases in which persistent neuralgia disappeared on excision of the cicatricial plug in a lacerated cervix. Other *reflex disturbances* (such as cataleptic convulsions, persistent salivation, profuse sweating, hysterical anuria) have disappeared after Emmet's operation. *General weakness* and inability to work are present here as in other chronic conditions.

The relation of laceration to malignant disease, of which it seems sometimes to be the starting-point, will be considered under Cancer of the Uterus.

DIAGNOSIS.

This presents, in many cases, no difficulty.

Occasional difficulty in recognition.

The *finger* feels the indentation or fissuring of the vaginal portion. Sometimes the cervical canal is patulous, and admits the distal phalanx of the finger easily. Difficulty in diagnosis arises when there is much eversion of the mucous membrane of the cervical canal with thickening of the cervical tissue; the fissure is thus obliterated, because the circle of the os is not formed of the os externum but of a higher unfissured portion of the canal. This thickening and the velvety feeling of the everted mucous membrane lead us to suspect the condition.

The *speculum* shows the cleft in the cervix with, in the great majority of cases, round it appearances which will be more fully described under Cervical Catarrh. We see a bright red irregular patch on one side of or surrounding the os; from its granular appearance, its vascularity, and the fact that it bleeds easily, it resembles an ulcerated surface. For this reason it is often described as "*ulceration*" of the cervix, but it is no more an ulceration than is the inflamed mucous membrane of the conjunctiva. By ulceration we understand a destruction and loss of tissue. The epithelium and subepithelial tissue may be destroyed as an immediate result of injury during labour; but the raw-looking surface, appearing secondary to and also independent of lacerations (*see*

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[1] To the importance of which Graily Hewitt has called attention in a recent paper (*loc. cit.*).

Catarrh in Nulliparæ), is not an ulcerated surface and should therefore not be treated as such.

As already mentioned (p. 114), Sims' speculum must be used; the other forms only mask the laceration.

For the appearance presented by the various forms of laceration when seen in the speculum, the student should compare fig. 178 and fig. 179. The difference between the colour of the everted cervical mucous membrane and that of the vagina is represented in Plate XII., figs. 1 and 2. A beautiful series of chromo-lithographs is appended to Mundé's article (Am. Jour. of Obstet., Jan. 1879), which illustrates the various degrees of laceration. The most complete series is in Nieberding's pamphlet which gives representations of the cervix uteri before and after parturition, both in primiparæ and multiparæ; the colouring, however, is unnatural.

The microscopic changes which produce the appearance simulating ulceration will be described under Cervical Catarrh.

The *tenacula* are a valuable adjunct in examination with the speculum. If we place one in the anterior and one in the posterior lip, and roll these in on one another, the raw-looking surface will in many cases disappear. This easily demonstrated fact had not been recognised till Emmet drew attention to it, and based on it the operation which will be always associated with his name. By thus rolling the lips inwards, we restore the laceration and see the extent of it so as to judge of the possibility of approximating the lips with sutures.

TREATMENT.

From what has been said in the introductory paragraph, and also under "Pathology," it is evident that the treatment of laceration of the cervix means much more than the closure of the split. Emmet in his operative procedure not only closes the laceration but excises the cicatricial tissue; he also makes his patients undergo a long preparatory treatment directed to the cervical catarrh. The cases calling for his operation are much fewer than might at first sight be supposed,[1] because no laceration however well marked calls for treatment unless it is producing symptoms; and there are other operations (Schroeder's and Martin's) for removing the consequences of laceration which are as efficient as Emmet's.

Immediate operation for laceration.

The stitching up of a laceration *immediately after parturition* was first performed by Pallen of New York. Having failed to check by the tampon post partum hæmorrhage from a lacerated cervix, he passed Sims' speculum and sewed up the laceration with silver-wire sutures; this checked the hæmorrhage. We have never had occasion to perform the "immediate" operation; injections of very hot water have always sufficed to check hæmorrhage. Considering the liability to septic inflammation in the puerperal condition, we would be very chary about operating unless the hæmorrhage were considerable and not diminished by hot injections.

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[1] Principles and Practice of Gynæcology: 1884, p. 483. The conservation as to this operation which exists in this country is almost justified by what Emmet says in his letter given in the interesting tabulated record of opinions of the leading operators which Zinke has collected as to when and when not the operation is to be performed; the italics are ours. "The Operation has long since passed out of my hands, and so fully endorsed that I have no fear for its future. The great point is to check the abuse, which is fearful. Every one feels competent to perform it; it is done without the proper preparatory treatment, and with no special purpose. I believe in *nine cases out of ten*, where it is done, or attempted, the execution of the operation is defective and without any benefit to the patient."

Emmet's Operation.

The paring of the edges of an *old laceration* and uniting of them with sutures is known as "Emmet's operation," which is a simpler and more suggestive name than "Trachelorrhaphy."

Preliminaries.

Preliminaries to Emmet's Operation.—The patient should use hot-water injections for some weeks previous to the operation, and apply a blister if there be any indication of cellulitis. Emmet lays great stress on this preparatory treatment, and says that we should not operate so long as there is any tenderness on pressure in the fornices. He further recommends, in cases where the cervix is thickened and the mucous follicles enlarged, scarification of the cervix and painting with iodine or tannin and glycerine.

Emmet's Operation for lacerated Cervix.

The Operation. The following instruments[1] are required:—

Vaginal douche,
Sims' speculum,
Volsellæ,
Tenacula,
Rubber ring,
Bistoury and scissors,
Dissecting forceps,
Short needles (fig. 105) straight and curved,
Needle holder,
Medium silver wire, or catgut.

The patient is placed under chloroform in the lithotomy posture (in the semiprone posture by Emmet, but this does not give the operator so much room); the sacral segment is drawn back with the speculum by an assistant, and the cervix is laid hold of with the volsella and drawn down. The uterus may be curetted at this stage. Draw the edges of the laceration together with the tenacula to see how much tissue must be pared from the edges of the cleft to allow it to be sewed up, and then proceed to operate. Slip the rubber ring over the volsella on to the cervix and place it so as to constrict the base; this prevents bleeding and thus allows the operator to see that the edges are completely pared, which is essential to union of the raw surfaces. Wash out the vagina with carbolised water. When possible, continual irrigation is kept up during the operation; with this, the india-rubber ring is not required as the stream of water keeps the denuded surface always clean. Now pare the edges of the laceration with the scissors or knife (fig. 180); scissors are preferable, because they cut with greater ease and rapidity.

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[1] It is of great advantage, as Martin has pointed out, to curette the uterus before operating on the cervix; this can be done at the one operation, in which case we need the curette and sounds dressed with cotton-wool dipped in iodine or carbolic acid in addition to the instruments mentioned.

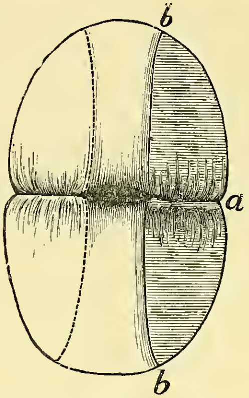

Fig. 180.
Operation for Lacerated Cervix; *a b* extent of denuded surface.

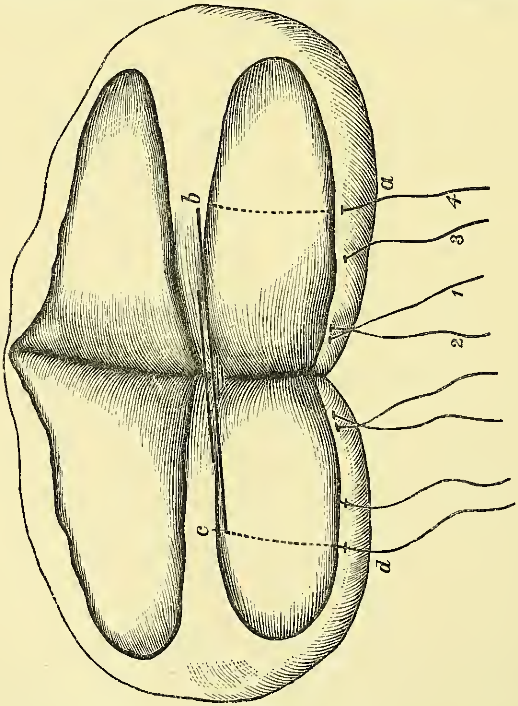

Fig. 181.
Extent of Denuded Surface and Course of Sutures according to Emmet (*Emmet*).
The sutures are passed in order 1 2 3 4; the course of suture 4 alone is indicated by letters *a b c d*.

With long-bladed scissors we can remove the tissue from one edge of the laceration with a steady clean cut right into the angle; Emmet lays great stress on the removal of the cicatricial tissue in the angle but uses the bistoury to do this. When the laceration is bilateral this must be done on both sides. Fig. 181 shows the extent of surface denuded by Emmet in a case of bilateral laceration. Great care must be taken to leave a broad strip (broader than represented in fig. 181) undenuded in the middle line to form the walls of the cervical canal. Now introduce the sutures; these if of wire are about eight inches long so that both ends protrude from the vagina, and are well adapted to the eye of the needle so as not to obstruct its passage. Emmet recommends the round needle as it makes a smaller hole and is therefore followed by less hæmorrhage; when the tissues are dense, the lance-shaped point perforates more easily. Catgut[1] has the great advantage over silver wire, that the stitches do not require to be removed afterwards; strong sutures are necessary, as some force is needed to tie them tight. Pass the sutures as in fig. 182, beginning at the upper part of the wound: each is drawn half through but is not twisted up till its fellows are in position, as it is sometimes necessary (when the tissues are thick) to pass the needle first through one lip and then through the other; they are then twisted up; the ends are brought out at the vaginal orifice, tied together, and wrapped round with a piece of wadding (fig. 183).

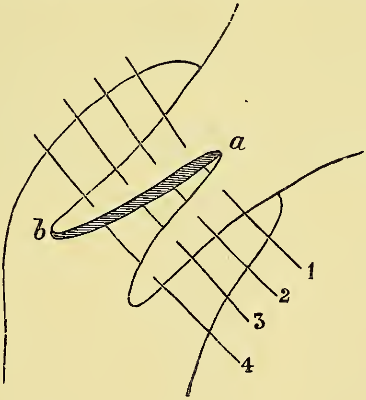

Fig. 182.
Mode of passing Sutures; *a b* denuded surface as in fig. 181. The sutures are passed in order as numbered.

Emmet cuts the sutures short, but the long ends facilitate their removal. No special regimen is required afterwards, the diet need not be restricted. Secondary hæmorrhage has sometimes followed the operation: it is best checked by passing a suture through the cervix higher up and tying it tightly on the side from which the hæmorrhage comes so as to constrict the vessels in the cervix.

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[1] Meinert recommends passing the catgut right through the cervix and fixing the ends with shot on plates: Eine sichere Catgutnaht für die Emmet'sche Operation: Archiv f. Gyn. XXXIII., S. 310.

Removal of wire sutures.—The stitches are removed on the seventh or eighth day. To do this we require speculum, wire-scissors, rake, and forceps. The rake is almost indispensable in removing sutures from the cervix or vagina; it is represented and described at fig. 173. The sutures are removed *from above downwards;* if we reverse the order, we may tear the lower portion apart in removing the upper sutures; if the surfaces have not entirely united, the lower sutures should be left in for a few days longer.

The effect of the operation on sterility has given rise to a great deal of discussion. Wells gives in his paper an interesting table of statistics as to subsequent conceptions, and affirms that the operation increases fertility; the proportion (one-fourth) of cases fertile after Emmet's operation is, however, the same as Emmet gives for cases of laceration generally, *i.e.* whether operated on or not.

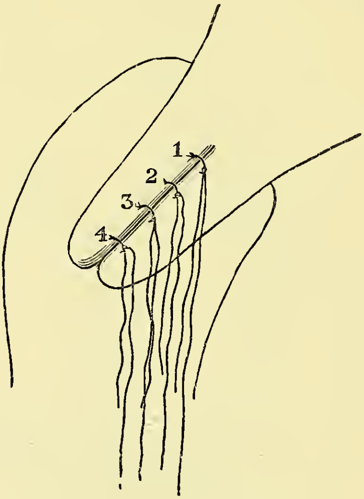

Fig. 183.

Appearance of Cervix with Sutures twisted up. They are left long so as to extend to vaginal orifice and are removed in order as numbered.

The cicatrix does not cause difficulty in subsequent parturition. The cervical catarrh may persist after the operation. Sometimes metritis, cellulitis, or peritonitis has unfortunately followed it. Six fatal cases have been collected by Wells.

Other operations to meet the consequences of laceration.—Emmet's operation is directed not only against the split but also its consequences, the cicatrisation and the cervical catarrh. Simply to close an old split would be as meaningless as shutting the stable door in the proverb. For the treatment of the catarrh, we have also Schroeder's excision of the mucous membrane of the cervix and Martin's amputation and excision, both of which will be described in the next chapter.

For extensive tear into the fornix[1] which has resulted in cicatrisation in the parametrium with lateral displacement of the uterus, Martin has introduced as a special operation[2] the separation of this cicatricial tissue from the cervix. Under chloroform, in the lithotomy posture, the cervix is drawn over with forceps from the affected side and a semilunar incision made in the cicatrix in the fornix, following the contour of the cervix. This may be sufficient; or it may be necessary in addition to cut out a portion of the cicatrised tissue. The antero-posterior incision is then stitched so as to bring front and back together and thus make the line of junction transverse.

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[1] See footnote 3, p. 292.

[2] Czempin (*loc. cit.*) gives three cases in which marked symptoms disappeared after this operation, and also a tabular report of nine more recent cases in Martin's clinique with similar good results.

CHAPTER XXX.

CHRONIC CERVICAL CATARRH.

LITERATURE.

Barnes—Diseases of Women: London, 1878, p. 530. *Bennett, G. H.*—Practical Treatise on Inflammation, Ulceration, and Induration of the Neck of the Uterus: London, 1845. *Candia*—L'amputazione della porzione dell' utero come cura radicale delle erosioni e della metrite parenchimale cronica: Annali di Ostet., 1888, 463. *Duncan, Matthews*—Diseases of Women: Lond., 1886. *Fischel*—Ein Beitrag zur Histologie der Erosionen der Portio vaginalis uteri: Archiv f. Gyn., Bd. XV., S. 76. *Fritsch*—Erosionen, Ectropium und Cervicalcatarrh: Billroth u. Luecke's Handbuch der Frauenkrankheiten, Stuttgart, 1885. *Hennig*—Der Katarrh der inneren weiblichen Geschlechtstheile: Leipzig, 1862. *Hildebrandt*—Ueber den Katarrh der weiblichen Geschlechtsorgane: Volkmann's Sammlung klin. Vorträge, Leipzig, 1872, No. 32. *Hofmeier*—Folgezustände des chronischen Cervixkatarrhs und ihre Behandlung: Zeitsch. f. Geb. u. Gyn., Bd. IV., S. 331. *Klotz*—Gynäkologische Studien über die pathologischen Veränderungen der Portio vaginalis Uteri: Wien, 1879. *Küstner*—Beiträge zur Lehre von der Endometritis, Erosion und Ectropium: Jena, 1883. *Mundé*—The treatment and curability of chronic uterine catarrh: Amer. Journ. of Obstet., 1883, p. 857. *Ruge and Veit*—Zur Pathologie der Vaginalportion: Zeitschrift f. Geb. u. Gyn., Bd. II., S. 415. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1879, S. 122. *Smith, Heywood*—So-called Ulceration of the Womb: Obst. Journ. of Great Britain, 1876, p. 604. *Steavenson*—Note on the use of Electrolysis in Gynecological Practice, and Discussion: Trans. Lond. Obs. Soc., June and July 1888. *Thomas*—Diseases of Women: London, 1880, pp. 275 and 336. *Vulliet*—De la dilatation permanente de l'utérus: Arch. de Toc., 1886, p. 933.

ACUTE catarrh of the cervix is known to us only as part of a general catarrh affecting both body and cervix, and will be described under Acute Endometritis. *Chronic catarrh* occurs localised in the cervical mucous membrane; it is a very common condition and one of the most troublesome which the practitioner has to treat.

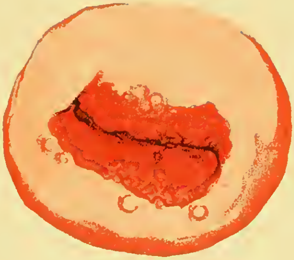
DEFINITION.—A chronic inflammatory process affecting the mucous membrane lining the cervical canal.

SYNONYMS.—Cervical endometritis, Endo-cervicitis.

PATHOLOGY.

The mucous membrane of the cervical canal is inflamed. When the os externum has been lacerated, the lips gape and the mucous membrane is thus everted; on bringing the margins of the laceration together, this eversion will disappear. Further, there are granular patches with irregular outline which extend beyond the limits of the os externum;

PLATE XII.



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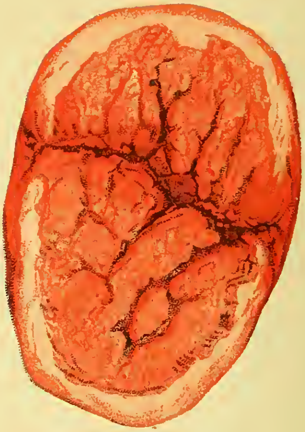

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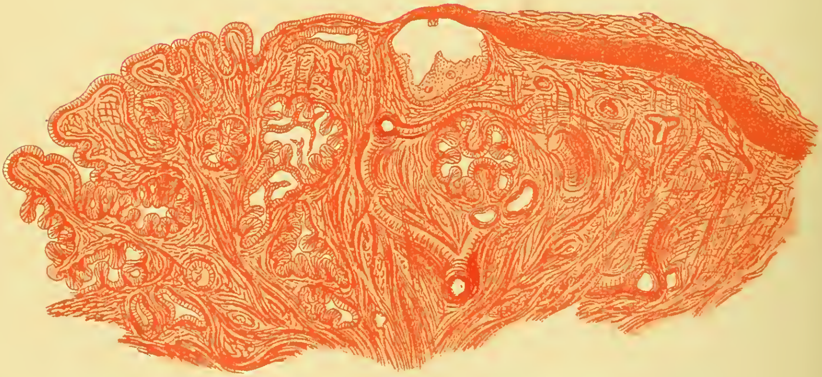

3

EROSION AND LACERATION OF CERVIX (RUGE AND VEIT).

W. & A. K. Johnston, Edinburgh & London

these have a red appearance resembling the cervical mucous membrane, and are therefore sharply defined from the paler mucous membrane which covers the vaginal portion of the cervix.

Pathology of so-called Ulceration of the Cervix.

This last condition was till late years generally held to be an "ulceration" and is still described, even in recent English works, under that name. The term should, however, be discarded as based on an erroneous pathology and suggesting most pernicious treatment. The cause of the error is easily explained: a raw-looking granular surface was seen with the speculum; the raw appearance was ascribed to the loss of the epithelium, and this supposition was supported by the microscopic examination of specimens taken from the dead body, in which the epithelium had been macerated and removed; the granular points were supposed to be the subjacent papillae which had become hypertrophied.

Ruge and Veit's investigations.

Both of these suppositions have been shown to be erroneous by the careful investigations of Ruge and Veit, who examined specimens of the so-called ulcerations cut fresh from the living subject; they demonstrated (1) that the apparently raw surface is covered with epithelium, (2) that the granular points are new formations and have no connection with the papillæ of the mucous membrane.

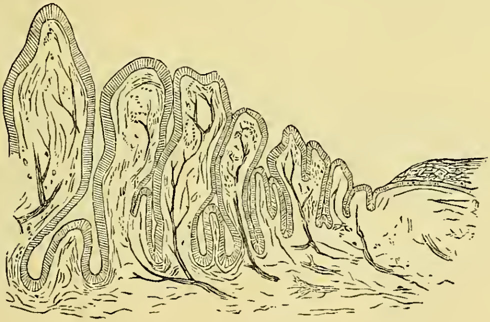

FIG. 184.
PAPILLARY FORM OF EROSION (*Schroeder*).

The microscopic appearance of the mucous membrane described by them is as follows. The surface is covered with a single layer of epithelium; the cells are smaller than those which line the normal cervical canal, and being narrow and long have a palisade-like arrangement; the thin layer of cells allows the subjacent vascular tissue to shine through, hence the *redness* of colour. The surface is further thrown into numerous folds producing glandular recesses and processes; these processes cause the *granular* appearance of the surface. The condition is well seen in Plate XII., and constitutes the *simple* erosion: fig. 1 shows such an erosion as seen in the speculum: fig. 3 shows a microscopic section of the same, stained with carmine; the left half of the section corresponds to the deep red portion of fig. 1, the right half to the paler portion outside of this. If the recesses be long and narrow, the surface is split up into distinct papillæ; this constitutes the *papillary* erosion (see fig. 184). If the ducts of the glandular recesses become obliterated, the section will distend the gland below and produce retention-cysts; these will increase in size, and may come to the surface and burst. Thus there is formed the *follicular* erosion (see fig. 185).

The raw-looking surface is therefore *a newly-formed glandular secreting surface*, resembling in structure the cervical mucous membrane. This addition to the extent of secreting surface increases the leucorrhœal discharge which is the leading symptom.

These observations of Ruge and Veit have been confirmed in their essential points by Fischel and other observers; Fischel considers the secreting processes, while being new formations, to have the structure of papillæ and not to be mere foldings of the mucous membrane.

Origin of the Epithelial new formation.

While there is, therefore, no disagreement as to the microscopical appearance of the so-called "ulcerations," the *origin* of this new epithelial structure is disputed. Ruge and Veit hold that this single layer of small cylindrical cells is produced by proliferation of the cells of the *deepest layer of the rete Malpighi*, while those of the superficial layer are shelled off; the appearance seen in fig. 185 favours this view. It will be observed also that they regard the simple follicular and papillary "ulcerations" as the results of one and the same process, viz., proliferation of epithelial cells. On the other hand, those red patches are generally continuous with the mucous membrane of the cervical canal and resemble it in their microscopic structure; it is therefore much more probable that they are occasioned by proliferation of the *epithelium which lines the cervical glands*, leading to an extension of the glandular surface beyond the os externum. Fischel holds that there is not only the proliferation

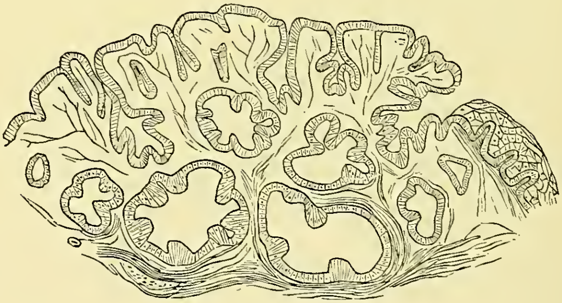

Fig. 185.
Follicular Form of Erosion (*Schroeder*).

of epithelial cells, but of connective tissue; and that according to the preponderance of the one over the other, the follicular or papillary forms are produced. He also thinks erosions are due to the persistence of the cylindrical epithelium (found outside the os externum in the fœtus) into adult life, and the desquamation of the squamous epithelium which had come to cover it.

The question as to the origin of the cylindrical epithelium found in erosions is rendered more difficult by the fact that the boundary-line between the squamous epithelium outside of and the cylindrical within the cervical canal varies at different periods of development and in different individuals. In the fœtus, according to Ruge's investigations, the cylindrical epithelium extends down the vagina also; and we have a hint of the persistence of this fœtal condition in the congenital ectropium described by Fischel. Klotz describes two types of cervix characterised by the distribution of the squamous epithelium: one, cavernous in texture, and having the squamous epithelium extending some distance into the cervix; the other, glandular in its substance, and having the squamous epithelium stopping at the usual seat of the os externum.

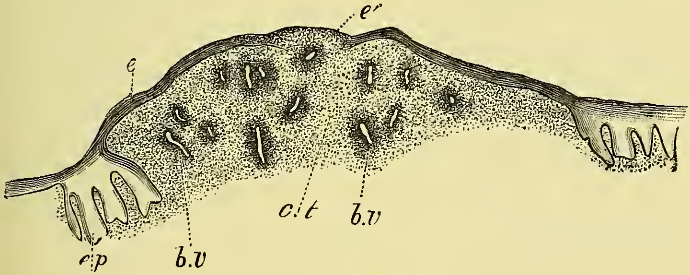

Fig. 186.

True Ulceration of the Cervix. At the sides of diagram is seen the normal epithelium, which is prolonged in processes, *e. p.* between the connective tissue papillæ; *e* is superficial layer of squamous epithelium reduced to a thin layer at *e'*; *c t*, tissue of mucosa infiltrated with small cells; *b v*, blood-vessels surrounded by small-celled infiltration (*Fischel*).

Nomenclature of the changes in Cervical Catarrh.

The foregoing description of the microscopic changes makes it evident that the process is not one of "ulceration;" and this term should, therefore, be abandoned. The German term Erosion is open to a similar criticism. "Ectropium" or "Eversion of the mucous membrane" describes the condition in its relation to laceration, but does not describe the extension of the secreting surface beyond the os externum; the term is preferable to "ulceration," as it is at least not misleading. Thomas describes these conditions under the name of "Granular and Cystic Degeneration of the Cervix Uteri." This term is based on the naked eye *appearance* of the cervix, and conveys no idea as to the pathological change which takes place. Under granular degeneration, he describes the papillary form; under cystic degeneration, the follicular. As we are not in a position to introduce a term based on pathology, it is preferable to designate it according to its symptom as Cervical Catarrh. The red patches which lie outside the os externum, we shall speak of as "*catarrhal patches.*"

Catarrhal Patches.

True Ulcerations.

Sometimes a true ulcerated process—destruction of epithelium with inflammation of connective tissue—does occur; such a condition is represented in fig. 186.

Along with those changes in the mucous membrane, chronic inflammatory changes occur in the other tissues of the cervix. There is increased formation of connective tissue, which produces antero-posterior thickening and sometimes elongation. The secretion in the obstructed glands becomes inspissated, and hence the retention cysts are felt as firm pea-like bodies—ovula Nabothii—in the substance of the cervix or projecting from it; or their contents may suppurate and form small abscesses. As there are no racemose glands on the vaginal portion beyond the limits of the os externum (see Histology of Normal Cervix, p. 21), these ovula Nabothii must be produced from the glands of the mucous membrane of the cervical canal or from the newly-formed glandular tissue. Fritsch draws attention to the fact that the glands of the cervix are enormously hypertrophied during pregnancy, so that the cervix becomes almost a glandular organ; the persistence of this condition after the puerperium, may explain the increased glandular formation which is described above as the chief pathological element in cervical catarrh.

Ovula Nabothii.

Cysts in the Cervix.

Sometimes we find a single large cyst in the cervix, due to obstruction of the mucous glands. When it is in the substance of the wall, the soft bulging into the cervical canal and the accompanying menorrhagia may lead one to suspect commencing sarcomatous infiltration. Puncturing with a trocar removes a clear or straw-coloured fluid, rich in mucous corpuscles.

The microscopic pathology of the cervix has only of recent years been carefully investigated, and there are many points on which definite information has not as yet been obtained. The following is a brief summary of the pathological changes described, which are best understood by comparison with the microscopic structure of the normal vaginal portion.

Normal and Pathological conditions of Cervix contrasted.

NORMAL CONDITION. The vaginal portion is covered on its vaginal surface with many layers of squamous epithelium, resting on papillae of connective tissue; there are no mucous follicles. The cervical canal is lined with a *single layer* of *cubical* epithelium (ciliated only on the ridges), folded so as to form shallow recesses which do not branch; there are *racemose mucous glands*, which have branching ducts. The substance of the cervix is made up of *connective* tissue.

Pathological Changes. These, according to the extent and duration of the process, affect the three elements—epithelium, glands, connective tissue.

The *epithelium* of the cervical canal may be simply exposed (ectropium after laceration), or it may be inflamed. When inflamed, the folding of the mucous membrane is greatly increased so that the surface has a papillary or granular appearance. Further, this inflamed mucous surface may be found extending beyond its normal limit (the os externum) in the form of red patches (catarrhal patches) which are smooth or granular.

The *glands* hypertrophy and new glands form as the result of the proliferation of epithelium described above. The openings of the glands are at first restricted to the area covered with a single layer of cubical epithelium, but their branching ends extend below the limiting surface of stratified squamous epithelium. Their ducts become obstructed, and retention cysts form not only on the red patches but also underneath the adjacent apparently normal vaginal mucous membrane. They may remain as little nodules in the mucous membrane, or may come to the surface and burst; in the latter case, the cubical epithelium and papillæ on the inner wall of the cystic gland are exposed and, being now on a free surface, proliferate. When the glands are the special seat of the pathological changes, the whole substance of the cervix is converted into a cystic mass.

The *connective tissue* always increases in amount, specially when the process is chronic. This increase constitutes the "areolar hyperplasia" of Thomas.

ETIOLOGY.

Frequency of Catarrh in Multiparæ.

The most important cause is, undoubtedly, the injury of the cervix produced in *parturition;* hence cervical catarrh is common in parous women. How this injury produces the inflammatory condition is a disputed point. Emmet refers it to the persistence of the split in the cervix, and holds that the exposure of the mucous membrane to friction against the vaginal walls leads to irritation and inflammation; but we frequently see cases of well-marked lacerations without consequent cervical catarrh. It is admitted by all that the existence of lacerations greatly favours the development of catarrh.

Other less important causes are the *spread of inflammation* from the vagina *upwards* (vaginitis, which may be simple or gonorrhœal), and from the endometrium *downwards.* The latter is favoured by the fact that the discharges from the endometrium necessarily flow over the cervix and irritate it.

Cervical catarrh is the most frequent complication of retroflexion of the uterus. The flexion favours gaping of the lacerated cervix and produces passive congestion of the cervical tissues.

SYMPTOMS.

These are—Leucorrhœa;
Pain in back and loins, increased on exercise;
Irregular menstruation;
Sterility.

Leucorrhœa is the prominent symptom. Under normal conditions the secretion from the mucous membrane of the uterus and cervix is not sufficient to attract attention; when it is excessive, it is termed leucorrhœa (λευκός white, ῥέω to flow) or in popular language "whites." A transparent leucorrhœa from the cervix and uterus occurs before and after the menstrual flow; this is a hyper-secretion due to temporary congestion.

Characters of Cervical Leucorrhœa.

The secretion from the glands of the cervical canal is clear and viscid, resembling unboiled white of egg. It becomes of an opaque white when mucous corpuscles are abundant, yellowish when pus corpuscles are present. Frequently, it is tinged with blood from the blood-vessels of the newly-formed vascular tissue.

Pain in the back and loins is present, as in all uterine disease. It is aggravated on active exercise, such as walking and riding, or whatever causes friction of the cervix against the vaginal walls.

Menstruation is irregular, and often increased in quantity; this is probably due to extension of inflammation upwards to the endometrium. We must take care not to mistake leucorrhœa tinged with blood for the regular menstrual flow.

Sterility is often present. In nulliparæ with a small os externum, the plug of mucus in the cervical canal is alleged to be a bar to conception. In multiparæ, we have seen conception take place even though there was a deep laceration and well-marked catarrh; the presence of catarrh, however, though not an obstacle to conception, greatly diminishes its probability.

PHYSICAL SIGNS.

Condition of Cervix in Chronic Catarrh.

On *vaginal examination*, the condition of the cervix is found to vary according as the patient is nulliparous or multiparous and the disease of long or short duration. In a nullipara, the cervix feels puffy and large, the margins of the os soft and velvety (when there is eversion with extension of catarrhal area beyond the os externum); or the os and cervix are apparently normal but movement causes pain (when the catarrhal area does not extend beyond the os externum). In a multipara, the existence of a laceration must first be determined and the extent of it noted; the margins of the os are soft and velvety, and pea-like nodules (Nabothian follicles) are felt on and sometimes round them; polypoidal projections may be present and, more rarely, the cervix is converted into a mass of cysts; the os is usually gaping so that the finger can be passed into the cervical canal, where the mucous membrane has an irregular surface and is often thrown into longitudinal ridges.

Appearance in Speculum of Cervix in Catarrh.

The *speculum* is now employed; its use must always be preceded by a careful examination with the finger to ascertain, when laceration is present, the undisturbed relations of the lips of the cervix. Neither finger nor speculum alone is sufficient, we must employ both, and learn to associate what is felt by the finger (*e.g.*, lacerations, velvety mucous membrane, pea-like follicles) with what is seen with the speculum. The superiority of the Sims speculum for examination is very marked, as it exposes the lips of the cervix without disturbing the relations.

In a nullipara, we see the os apparently normal but with a tenacious plug of mucus projecting through it; or there may be red catarrhal patches such as are represented in Plate XII., fig. 1, which shows very well the contrast between the appearance of these patches and the surrounding mucous membrane; no chromo-lithograph, however, perfectly displays the natural colours.

In a multipara, a laceration is sometimes evident. Oftener it escapes recognition; the os appears to be wide and unfissured, while on both lips there is a red velvety surface (Plate XII., fig. 2); if, now, tenacula be fixed in the gaping lips and those rolled in on one another, the red surfaces will disappear and a bilateral laceration become evident. Sometimes, white cicatricial tissue indicates the situation of the laceration. Though the lips are thus approximated, a red surface is often visible because the catarrhal area has spread beyond the os externum. The obstructed Nabothian follicles appear as bluish-red projections from the mucous membrane; occasionally, they form small polypi.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

Diagnosis of Cervical from Vaginal Leucorrhœa,

The diagnosis between cervical and vaginal catarrh is made clear by using the speculum, for we see in the former case the leucorrhœa coming from the cervix and having the characters above described. Should the discharge not be profuse enough to be seen with the speculum, we may employ the method recommended by Schultze for diagnosing between uterine and vaginal catarrh. The vagina is douched out in the evening, and a tampon soaked in a solution of tannin is placed against the os externum; in the morning the tampon is removed through the speculum, and we note the quantity and character of the discharge which has accumulated upon it.

from Endometritis.

The diagnosis between cervical catarrh and endometritis is difficult, and in many cases cannot be made; when cervical catarrh is present, we cannot be positive that there is not some endometritis as well. Increase in the length of the uterine cavity (especially with tenderness or irregularities of the mucous membrane) ascertained by the sound, indicates endometritis. When the cervix is much thickened and indurated, we may suspect the commencement of malignant disease; this will be considered under Carcinoma of the Cervix.

PROGNOSIS.

In this we must consider the constitutional health of the patient, the duration of the symptoms, and the extent to which the tissues are affected. According to Thomas, the prognosis is less favourable when there is considerable secretion of mucus with little apparent "granular degeneration." The practitioner will often find that cases of cervical catarrh have already passed through several hands, and he should therefore be on his guard in offering hopes of speedy cure.

TREATMENT.

Constitutional treatment important.

In the first place, special attention must be given to the patient's *general health;* if we trust to local treatment alone, we shall often be disappointed. We should recommend change of air and light nourishing food. A certain amount of exercise is valuable; but too much of it, specially of riding, is injurious. Tonics (such as arsenic, quinine, and iron) are useful. Disturbances of the digestive system, which are frequent in chronic cases, must be treated as each case indicates. Complete rest from sexual activity is advisable; this can often be secured by recommending that the patient go away from home for a time.

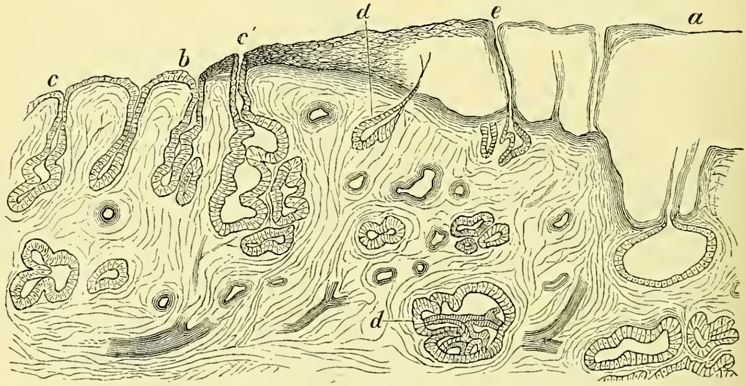

Fig. 187.

Healing of a Catarrhal Patch treated by Astringent or Antiseptic Injections (*Hofmeier*). *a* to *b*, newly-formed squamous epithelium; from *c* to *c′*, is seen alteration of the epithelium at the mouths of the glands; *d*, *d*, glands with ducts obliterated; *e*, gland-duct which has persisted.

Cervical catarrh is in some cases only a local manifestation of a constitutional state such as tuberculosis or anæmia.

The *local treatment* varies according as the patient is nulliparous or multiparous. In both cases we must be prepared to carry out a system of treatment which lasts for weeks.

Local treatment in Nulliparæ.

1. *In nulliparæ* we begin with a course of vaginal injections of hot water. These are used freely, from ten minutes to a quarter of an hour, every night. To the simple water, astringents or antiseptics are added: sulphate of zinc (ʒj to the pint); sulphate of alumina or sulphate of copper (ʒij to the pint), or corrosive sublimate (1 to 4000).

The action of these on the catarrhal patches has been specially investigated by Hofmeier and by Küstner. The former found that such a patch, treated by daily vaginal injections of pyroligneous acid, became gradually encroached on by the surrounding squamous epithelium's creeping in tongue-like processes over the cylindrical epithelium. The more superficial glands become filled up with the squamous epithelial cells; the deeper ones had their ducts narrowed or even plugged, while the gland-cavity persisted below (fig. 187). Küstner found that similar changes could be produced by antiseptic douches.

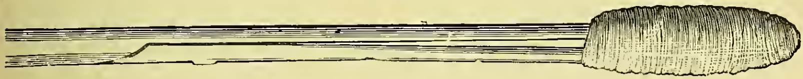

Fig. 188.
Forceps dressed with Cotton Wadding.

If the os be narrow, it is good to notch it bilaterally with the scissors. This acts beneficially by allowing the mucus to escape freely. Mundé recommends the trimming of the lips of the cervix so as to produce a funnel-shaped os.

When we find that the secretion continues copious in spite of the frequent injections, we must make a local application to the mucous membrane. Of applications the best are iodine (the tincture or the strong liniment) and carbolic acid, the former in milder and the latter in more severe cases. The liquor hydrargyri pernitratis is recommended by Heywood Smith, and chromic acid is much praised by De Sinéty. In making these applications we proceed as follows. The mucus, which would prevent the action of the medicament on the mucous membrane, is first thoroughly removed by the forceps dressed with cotton wool as represented at fig. 188. A second pair of forceps, covered merely with a film of cotton wadding, is now dipped in the medicament and applied

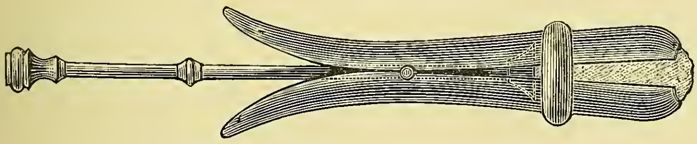

Fig. 189.
Barnes' Speculum for introduction of medicated cotton wool into the vagina (*Barnes*).

to the surface. Should the canal be narrow, a sound dressed as for endometric applications (see fig. 196) is preferable. Care is taken that there be no free drop of the solution on the cotton wool, which might fall on the vaginal mucous membrane; after the application is made, a pledget of cotton wadding with glycerine is placed below the cervix.

Rarely in nulliparæ is the pathological process so extensive as to require operative means for removing cervical tissue.

Local treatment in Multiparæ.

2. *In multiparæ.* Here the cervical catarrh is usually associated with other conditions—retroflexion, subinvolution, and, especially, marked laceration of the cervix. The first treatment indicated is to diminish the passive congestion of the cervix by hot-water injections with astringents or antiseptics, and the use of the glycerine plug. The latter is prepared as already described (p. 204), and should be renewed daily. The patient can introduce it herself with Barnes' speculum (fig. 189). A simpler means is to draw the string through a piece of glass tubing, and to keep it taut with the finger on the end of the tube till the plug is carried into the roof of the vagina; then the finger is removed and the tube slipped out over the string. If the uterus be retroflexed, it should be replaced and kept in position by a pessary. Even where it is not retroverted, a pessary is often useful in lifting the uterus upwards in the pelvis and diminishing passive congestion. In cases where there is a distinct laceration of the cervix, and specially where the catarrhal patches can be made to disappear by rolling the lips inwards on each other, Emmet's operation is indicated.

Depletion by Scarification or Leeches.

Local depletion by scarification or leeches was formerly much employed, but is not used now; its effects are only transitory. Scarification is done best through the Fergusson speculum, and with a lancet-shaped bistoury; a number of small punctures are made, from a quarter to half-an-inch in depth. Leeches are applied as follows:—Fergusson's speculum is passed; a pledget of lint, with string attached, is placed in the cervical canal to prevent their crawling upwards into the uterine cavity; a little blood is drawn by superficial scratches and three or four leeches thrown into the speculum, and pushed up towards the cervix with a pledget of cotton wadding. We must watch the speculum lest the leeches slip out; after the speculum and leeches are removed, the vagina is douched with a tepid injection of carbolised water.

Scarification is, however, useful for another object. When there are hard knobby retention cysts producing irritation by the pressure of their contents, the puncturing of these diminishes the chronic inflammation. Paquelin's cautery is also used to puncture the cervix; but this use of it belongs rather to the treatment of the hypertrophy of the cervix in Chronic Metritis.

In very chronic cases, the only remedy is the destruction of the diseased glandular tissue—just as in tonsilitis we partially excise the tonsils. This has been done by the application of strong caustics or the cautery. The zinc-alum sticks introduced by Skōldberg of Stockholm are recommended highly by Matthews Duncan. They are made by fusing together equal parts of sulphate of zinc and sulphate of alumina, and running into moulds. The stick is pushed into the cervix, and a plug of wadding laid in the vagina to keep it in place and receive the discharge. The student must discriminate this use of a powerful caustic once for all from the repeated touching of the surface with a milder caustic just as one would touch a slow ulcer—a treatment which cannot be too strongly condemned.

Electricity has been used both in France and this country with the same object, viz., the cauterisation of the cervical glands. An electrode with a rounded end (or a uterine-sound one if it has to be passed up the canal) is connected with the negative pole of the battery, while the positive pole is placed on the surface of the skin. Several cases[1] have been treated successfully by this method, but it remains to be seen whether it possesses advantages over other forms of cauterisation to compensate for the difficulties in its use.

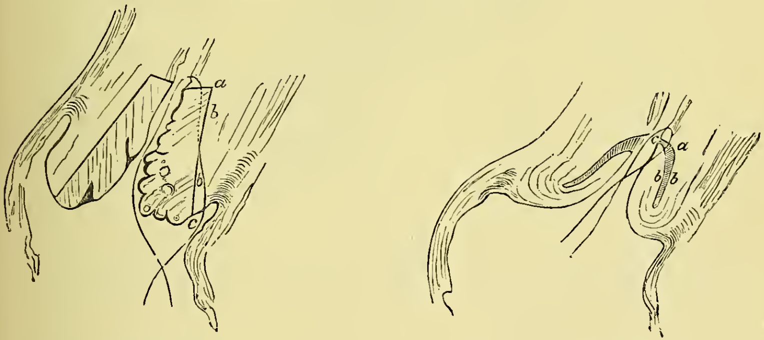

FIG. 190. FIG. 191.

SCHROEDER'S EXCISION of the CERVICAL MUCOUS MEMBRANE in cervical catarrh. Fig. 190 LINE of INCISION in MUCOUS MEMBRANE. Fig. 191 MUCOUS MEMBRANE EXCISED and flap *bc* turned in on *ab* (*Schroeder*).

Thomas recommends the steel curette for the removal of the diseased glands; it is applied "so forcibly as to remove the arbor vitæ and mucous glands from the os internum to the os externum. Sometimes a second operation in two or three weeks after the first has been necessary, and sometimes even a third."

Schroeder's Operation for Cervical Catarrh.

Schroeder used the knife, and operated as follows. The cervix is laid hold of with two volsellæ, one on each lip, and drawn downwards. It is divided laterally as far as the fornix with the scissors, so as to form an interior and a posterior lip which are separate as far as the vaginal roof

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[1] *Lovell Drage and Gibbons*—Brit. Med. Journ., 1888, I., p. 1274. *Touret*—Nouv. Arch. d'Obstet. et de Gyn., April, 1887.

(fig. 190). A transverse incision (seen in section, at *a*, in fig. 191) is made across the base of the anterior lip, dividing the whole thickness of the cervical mucous membrane. He next pierces the point of the lip at *c*, pushing the knife in the direction *bb* till it reaches the cross incision *a*; he carries the blade outwards first to one side and then to the other, so that all outside of the line *a b c* is cut away. The flap of cervix is now turned in, and stitched as in fig. 191. The advantage claimed for this method of operating is that the degenerated cervical mucous membrane is replaced by vaginal mucous membrane which shows no tendency to degenerate. Schroeder operated thus more than three hundred and fifty times (two deaths), and with very good results as to the cure of the catarrh.

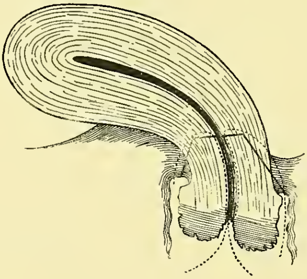

FIG. 191A.

MARTIN'S METHOD OF EXCISING THE MUCOUS MEMBRANE OF THE CERVIX (*Martin*).
The continuous black line shows line of excision, which is higher up in the fornix than in fig. 190; the dotted line is the course of the suture introduced after the piece of the lip is excised.

Martin of Berlin in excising the diseased mucous membrane sometimes removes more of the substance of the cervix, as fig. 191A shows, thus combining amputation with excision. He splits the cervix into two lips, cuts through the cervical mucous membrane in the posterior lip above the diseased portion, then removes as much of the lip as is necessary, and stitches it. The anterior is treated in the same way; and then the sides are sutured—the sutures often requiring to be passed deeply to control bleeding. In introducing these last the volsella can be taken out and the cervix held down by the sutures in the two lips.

CHAPTER XXXI.

ENDOMETRITIS.

LITERATURE.

Atthill—On Endometritis: Dublin Jour. of Med. Sc., Jan. 1873. *Barnes*—Diseases of Women: London, 1878, p. 530. *Braun, Carl*—Therapie der Metritis und Endometritis, etc.: Wiener med. Wochenschrift, 1873, Nos. 39-43. *De Sinéty*—Gynécologie, p. 327: Paris, 1879. *Doléris*—De l'Endométrite et de son Traitement (with Discussion): Archiv. de Toc., 1887, pp. 97, 145, 193, 314, 460. *Fritsch*—Dilatation of the Uterus and Intra-uterine Therapeutics: Amer. Journ. of Obstet., 1883, p. 113. *Guérin*—De la Métrite aigue: Annales de Gynécolog., Juillet, 1874; and Arch. de Tocologie, Juillet, 1877. *Heinricius*—Ueber die chronische hyperplasirende Endometritis: Arch. f. Gyn. Bd. XXVIII., S. 163. *Heitzmann*—Pathologie und Therapie der nicht puerperalen Endometriden: Centralb. f. die gesammte Therapie, 1886, Nos. 1-5. *Hennig*—Der Katarrh der inneren weiblichen Geschlechtstheile: Leipzig, 1862. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane: Wien, 1864, S. 211. *Küstner*—Beiträge zur Lehre von der Endometritis: Jena, 1883. *Olshausen*—Ueber chronische hyperplasirende Endometritis des Corpus Uteri: Archiv f. Gynäkologie, Band. VIII., Heft 1. *Playfair*—Intra-uterine Medication: Brit. Med. Jour., December 1869; Ibid., March 1880; Lancet. January and February, 1873. *Réeamier*—Des granulations dans la cavité de l'utérus: Annal. de Therap., Nov. 1846. See also Union Méd. de Paris, Juin 1850. *Routh*—On "Fundal Endometritis:" Lond. Obst. Trans., Vol. XII. Cases of Menorrhagia treated by injections, etc.: Lond. Obst. Trans., Vol. II. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1886, S. 108. *Simpson, Sir J. Y.*—Diseases of Women: Edinburgh, 1873, p. 736. *Smith, Tyler*—Pathology and Treatment of Leucorrhœa: London, 1855. *Thomas*—Diseases of Women: London, 1880, p. 268. See also Index of Recent Gynecological Literature in the Appendix.

INFLAMMATORY action may affect the peritoneal covering, the muscular substance, or the mucous membrane of the uterus, producing *perimetritis*, *metritis*, or *endometritis*. Usually we find more than one of these conditions present at once, as the inflammatory action is rarely limited to one of these coats. Perimetritis is only a part of pelvic peritonitis, under which head it has already been considered.

We now consider inflammation limited to the mucous membrane of the uterus—endometritis, which may be acute or chronic.

DEFINITION.—Inflammation of the mucous membrane of the uterus.

SYNONYMS.—Uterine catarrh, internal metritis.

PATHOLOGY.

In *acute endometritis* both body and cervix are involved, and usually the underlying muscular coat also. The mucous membrane is swollen and soft, and covered with red-stained mucus or creamy pus. Extravasations of blood are present as red streak or patches. These changes are not so marked in the cervical mucous membrane as in that of the body; the vaginal portion has the same appearance as during pregnancy, being soft and swollen and showing red catarrhal patches round the os.

The ciliated epithelium is destroyed, and sometimes casts of the epithelium of the glands are found in the discharge (*Schroeder*). The secretion is at first serous, then purulent.

In *chronic endometritis*, the mucous membrane is hypertrophied and marked with patches of old extravasation.

Microscopic changes in Chronic Endometritis.

The microscopic appearances have only of recent years been worked at, and there is considerable difference of opinion both as to the changes produced and the significance of them. To understand these, we must keep in mind the two essential elements of the mucous membrane—the glands and the inter-glandular tissue; and also the view of Leopold, who considers the inter-glandular tissue as made up chiefly of lymphatics.

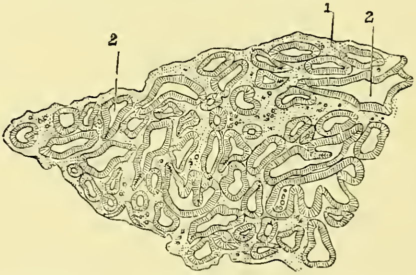

FIG. 192.

CROSS SECTION OF A GRANULATION IN A CASE OF ENDOMETRITIS (*De Sinéty*). 1. Stroma; 2. Dilated glands. ($\frac{40}{1}$)

Ruge's three varieties.

Accordingly, as the changes affect principally one or other of the two elements of the mucous membrane, Ruge[1] finds a *glandular*, an *interstitial*, and a *mixed form*—the last being a combination of the first two.

In the *glandular*, a marked growth and increase of the glandular epithelium occurs. The gland-ducts hypertrophy (Pl. XIII. fig. 3), and through multiplication of the epithelium may have bulgings of it into their lumina, making them saw-like instead of tubular in section, or the wall may be thrown into folds (*cf.* appearance of normal glands Pl. XIII. fig. 1 with Pl. XIII. fig. 3). In addition to hypertrophy there may be hyperplasia (Pl. XIII. fig. 4), the glands increasing in number either through lateral branching or the ingrowth of new ones from the surface. In the *interstitial* (Pl. XIII. fig. 2), the stroma is affected —in recent cases its cells, in more chronic the intercellular substance. In

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[1] Schroeder—op. cit. S. 112.

PLATE XIII.

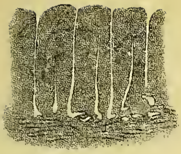

FIG. 1.

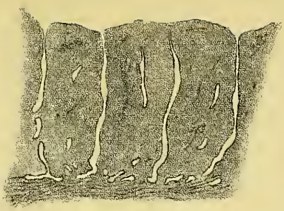

FIG. 2.

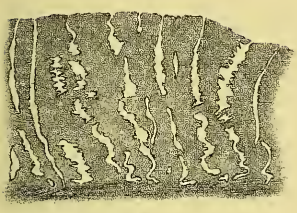

FIG. 3.

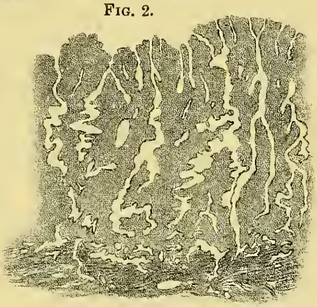

FIG. 4.

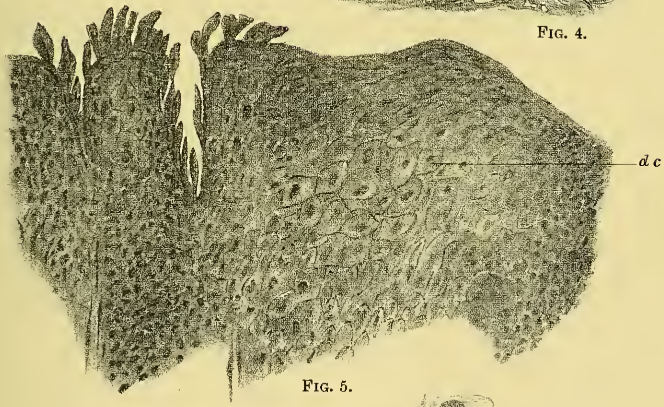

FIG. 5.

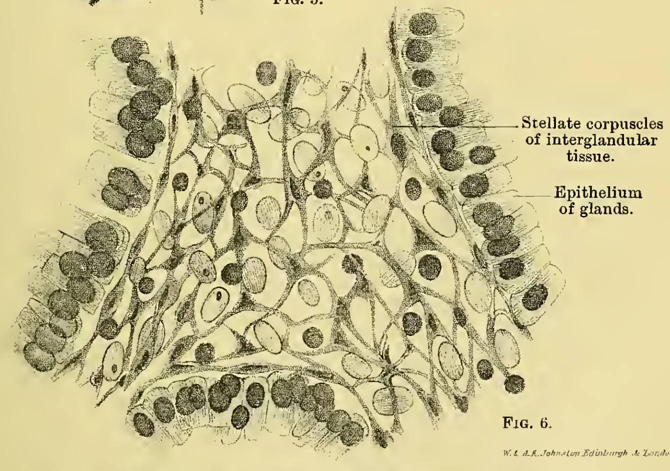

FIG. 6.

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MUCOUS MEMBRANE OF UTERUS IN ENDOMETRITIS
(FIGS. 1—5, *Ruge;* FIG. 6, *Heinricius*).

FIG. 1. Normal Mucous Membrane, FIG. 2. Interstitial Endometritis,
FIG. 3. Glandular hypertrophic E., FIG. 4. Glandular hyperplastic E. (all magnified ten times).
FIG. 5. Endometritis after abortion showing group of decidual cells *d c*
FIG. 6. From E. fungosa showing nature of changes in interglandular tissue (*v.* p. 318).

the recent cases, there are abundance of small cells (like nuclei only from the small quantity of their protoplasm), which, if recovery does not take place, pass into spindle-cells arranged in interlacing bands; sometimes, they swell up and take on a decidual character—the nuclei becoming larger and containing nucleoli. In the chronic cases, the intercellular substance is thickened by exudation and its fibres increased and thickened.

In Endometritis after abortion, small islands of decidual cells (which have not undergone retrograde changes as rapidly as the rest of the decidua) are sometimes found with small-celled proliferation going on round them (Pl. XIII. fig. 5).

Olshausen's Endometritis Fungosa.

A special form of Endometritis was carefully described by Olshausen under the name of *E. fungosa*. In it the mucous membrane is hypertrophied to three or four times its normal thickness. It is elevated through its whole extent in a soft cushion-like swelling, or in more localised spongy masses; the hypertrophy does not extend beyond the os internum to the cervix, and thus resembles in its situation a decidual membrane. The portions removed by the curette are unusually thick; one side presents a smooth rose-coloured surface which resembles the appearance of the mucous membrane of the intestine, and the other has a deep-red raw-surface. "The microscopic examination of these scrapings," Olshausen says, "shows that there is great hypertrophy of the mucous membrane with increase of all its elements—moderate dilatation of the lumina of the glands, enlargement of the blood-vessels, and marked cellular infiltration of the connective tissue" (fig. 193). The characteristics of this type are, that the glands do not become enlarged so as to produce cystic dilatations, and that the blood-vessels are greatly distended; the latter fact explains the hæmorrhage which is the chief symptom. De Sinéty gives a figure which shows the dilatation of the blood-vessels in this vascular type of Endometritis (fig. 194).

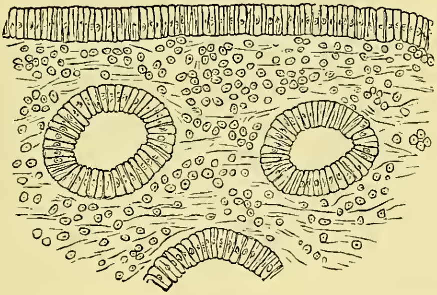

Fig. 193.

Vascular type of Endometritis—Endometritis fungosa (*Olshausen*).

In some cases of Endometritis fungosa, Zeller found that portions of the exfoliated mucous membrane consisted of squamous epithelium arranged in several layers—a sort of psoriasis uterina. This shows that columnar epithelium may change into squamous, a fact of great interest with regard to the changes in catarrhal patches described in the preceding chapter.

Heinricius' view of Endometritis Fungosa.

Heinricius has recently described the scrapings taken from a large number of cases of fungous endometritis. A thin section, with sparing infiltration give under a high power[1] the appearance seen in Pl. XIII. fig. 6. The stroma between the glands (the epithelium of which is seen in the corners of the section) consists of a basis of stellate corpuscles with anastomosing processes upon and between which lie two varieties of cells—large, oval, faintly stained ones, and others, small, round, and deeply stained, the former being the nuclei of an endothelium, the latter lymph corpuscles. He thus agrees with Leopold that the interstitial tissue consists largely of lymph sinuses. When inflammation occurs, the lymph corpuscles and those of the endothelium proliferate and produce an appearance resembling a "small-celled infiltration," for the basal network is obscured by them. He thus comes round to practically the same condition as Olshausen has described, but assigns a different position to the small cells.

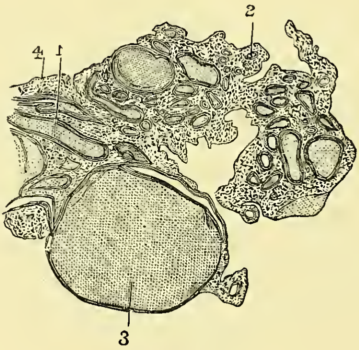

FIG. 194.

CROSS SECTION OF GRANULATION COMPOSED OF DILATED VESSELS IN A CASE OF ENDOMETRITIS ($\frac{40}{1}$). 1. Vessels cut longitudinally; 2. Vessels cut transversely; 3. Dilated vessel filled with blood corpuscles; 4. Embryonic tissue (*De Sinéty*).

Landau and Abel[2] deny the existence of a hyperplastic glandular form of Endometritis and would recognise only the *E. fungosa*, making the cases of hypertrophied glands a localised *Adenoma simplex*. Their argument is that the changes in any inflammation are primarily in the interglandular tissue, the changes in the epithelium of the glands being so to speak accidental and the result of the hyperæmia. The "cork-screw-like hypertrophy" is a normal condition. Where the glands actually grow, it is an *Adenoma.* Further, as to the interglandular changes, the decidual cells described by Ruge are not peculiar to the uterus, but simply the large epithelial cells (fibro-blasts) which are an intermediate stage in the formation of connective tissue from inflammatory products in any situation.

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[1] Zeiss, Ocular 3, Water immersion K.

[2] Beiträge zur pathologischen Anatomie des Endometrium: Archiv f. Gyn., XXXIV., S. 165.

Villous or Papillary form of Endometritis.

Another form of Endometritis is described by De Sinéty. "In other cases," he says, "the vegetations are specially constituted of embryonic tissue with few blood-vessels. There are only traces of the glands and some remains of more or less degenerated epithelium. We have to do with a truly inflammatory tissue comparable to that which forms upon an exposed wound. At certain points there are islands of degenerated elements which are not coloured by reagents and are analogous to those observed in foci producing pus. The degeneration of embryonic elements explains to us the abundance of the muco-purulent discharge observed during life" (fig. 195). Slavjansky also has described a villous or papillary form of endometritis in which the mucous membrane has lost its epithelial covering and has its inner layer composed of embryonic connective tissue.

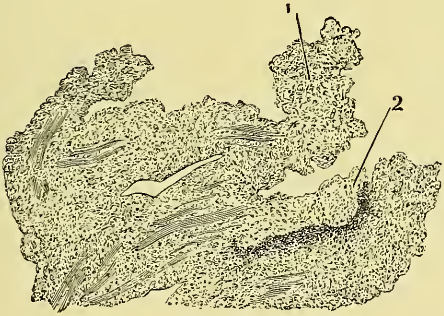

Fig. 195.

Cross Section of Granulation composed of Embryonic Elements, from a case of Endometritis. 1. Embryonic tissue; 2. Part undergoing fatty degeneration (*De Sinéty*) ($\frac{40}{1}$).

Ultima changes in Endometritis.

When chronic Endometritis has persisted for a long time, the mucous membrane becomes atrophied; the ciliated and afterwards the cylindrical epithelium is lost, and small polymorphous cells resembling squamous epithelium take their place; finally, the mucous membrane disappears altogether and the uterine cavity comes to be lined with a layer of connective tissue. The glands fall out so that the mucous membrane becomes mesh-like, or they are constricted to form retention cysts.

Senile Endometritis.

Senile atresia of the cervical canal is the result of a localised chronic Endometritis. This is one of the physiological changes which occur after the menopause. In some cases, however, it becomes pathological;

accumulation of mucus, more rarely of blood, takes place above the obstruction.

Heitzmann's classification of Endometritis.

Approaching Endometritis from a clinical standpoint, Heitzmann classifies its various forms as follows. Taking Hypersecretion, Hæmorrhage, and Pain, he forms three groups according as one of these is the prominent symptom. In the first group (with Hypersecretion) there is a *catarrhal* and a *gonorrhœal* form. In the second (with Hæmorrhage), we have (1) a *diffuse hypertrophic*, the mucous membrane resembling that just before menstruation, the pathological changes being *interstitial*, and goblet-cells[1] in the secretion being characteristic; (2) a *papillary*, referred to above as described by Slavjansky, and probably also by De Sinéty; (3) *endometritis fungosa*, of Olshausen; (4) *e. polyposa*, a rare form described by Klebs, in which the mucous membrane was elevated in transverse ridges, and large stellate cells and dilated lymphatics were found in the stroma; (5) *e. decidualis*, which includes cases occurring after abortion. In the third group (with Pain) there are three forms: *e. dysmenorrhoica*, with Pain only; *e. exfoliativa*, with, in addition, the discharge of a dysmenorrhœal membrane; and *e. dissecans*, a rare form described by Kubassow, in which muscular tissue as well as mucous membrane is separated and expelled with severe symptoms. This last group will be considered under the chapter on Dysmenorrhœa. In addition to these three groups, he adds an *atrophic* form which is physiological and occurs after the menopause.

In summing up the facts as to the pathology of Endometritis, we find that Ruge describes changes sometimes specially affecting the glands, sometimes the interglandular tissue; that Olshausen and Heinricius, directing their attention to a special form in which the mucous membrane is spongy and bleeds freely at the menstrual period, describe changes chiefly interstitial; that De Sinéty and Slavjansky make a third type in which a granulation tissue is produced in the uterus; and that Heitzmann, approaching the subject from an entirely different standpoint, groups isolated forms according to their leading symptom.

A clinical classification would be the best were we sure of our ground, but proof is yet wanting that there is increased secretion from the uterine glands,[2] for Leucorrhœa may, as far as we know, be always cervical in origin. Pain, also, may not be connected with changes in the uterine mucous membrane. Hæmorrhage is the only symptom by which, without doubt, Endometritis shows itself.

A pathological classification is what we must aim at, but it will be a long time before such an one will be established. Bits of tissue removed by the curette are very unsatisfactory materials for working out the nature of a pathological process, however important their examination may be for differential diagnosis. The physiological changes in the uterine mucous membrane connected with menstruation (see Chap. VII.) are a disturbing factor. A scraping immediately before the period will give quite a different appearance from that just after.

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[1] See another paper by him on the "Changes in the Epithelium in Endometritis:" Wien. med. Jahrbücher, Dec. 1885.

[2] There *is* such a condition as hyperplasia of the glands, but an *adenoma* does not imply increased secretion.

ETIOLOGY.

Acute endometritis is a rare condition, and never occurs before puberty. It comes on most frequently in connection with menstruation, when the physiological congestion readily passes into inflammation. It is occasioned by exposure to cold or sexual excess at the periods, and by the extension of gonorrhœal inflammation from the mucous membrane of the vagina. It also occurs in the exanthemata, typhus, scarlet fever, and measles; it has further been observed in cholera (*Slavjansky*), and in certain cases of phosphorus poisoning. In puerperal inflammation, endometritis is of course present.

Chronic endometritis is occasionally the result of acute; most frequently, however, it arises independently. Sometimes it is merely the indication of the constitutional state; in scrofulous and chlorotic cases, the normal leucorrhœa (which precedes and follows menstruation) is increased in quantity and prolonged during the intermenstrual period. This is due to hypersecretion rather than to inflammation. Increased leucorrhœa, with diminished menstrual flow, is quite characteristic in phthisis.

Causes of Chronic Endometritis.

Chronic endometritis arises independently from the following causes:—

Parturition, specially when the uterus has not been completely emptied;
Exposure to cold during menstruation;
Polypi or other tumours in the uterine cavity;
Direct injury through incautious use of sound or tent;
Extension of gonorrhœal or simple inflammation from vagina and cervix.

It has also been found after non-physiological amenorrhœa.

Of these the most important are *parturition* and *displacements*.

As regards parturition, endometritis is frequent after abortion; usually this is due to the patient's rising too soon, or to the incomplete emptying of the uterus. Küstner has traced the transition of a portion of decidua, retained after abortion, into a tissue having the structure of a mucous polypus. As to the frequency of this occurrence, he says that, of 112 cases of endometritis, 9 were cases of deciduoma. After full-time labour, the seat of the placenta seems to be in many cases the starting-point of the inflammatory process.

Uterine displacements do not necessarily produce endometritis. We sometimes find a retroversion or retroflexion which has produced no symptoms. As a rule, chronic inflammation of the endometrium, as well as of the muscular coat, results from passive congestion.

Brennecke[1] and, more recently, Heinricius[2] have drawn attention to the occurrence of endometritis following non-physiological amenorrhœa. After irregular menstruation (at longer or shorter intervals), or complete amenorrhœa, profuse bleeding takes place from the uterus. It is most common in patients towards the menopause, but has also occurred in anæmic or poorly nourished girls. They ascribe it to lowered activity of the ovaries so that the hyperæmia at the menstrual period leads only to hyperplasia of the uterine mucous membrane, not to hæmorrhage; hence the mucous membrane becomes hyperplastic, and when hæmorrhage does return it is profuse.

SYMPTOMS.

A. *Of Acute Endometritis.*

These are fever more or less severe, according to the inflammation, pain in the back and lower part of the abdomen with the sensation of weight in the pelvis, and in severe cases vesical and rectal tenesmus. The characteristic symptom is the discharge, which is at first clear and watery but after a few days becomes creamy and purulent. The menstrual flow is sometimes suppressed, rarely is it increased.

B. *Of Chronic Endometritis.*

The symptoms usually given are the following :—

Menorrhagia ;
Leucorrhœa ;
Dysmenorrhœa ;
Weakness in the back ;
Pain in pelvis and loins ;
Digestive derangements ;
Sterility ;
Abortion.

Menorrhagia is the characteristic symptom, and may become serious from the anæmia which it produces. It shows itself first in increased duration of the menstrual flow, which becomes gradually prolonged over the intermenstrual period till the loss of blood becomes continuous. *Dysmenorrhœa* is frequently present, but it is more probably due to complications (*e.g.*, flexions or chronic metritis than to the condition of the mucous membrane). Membranous dysmenorrhœa (accompanied with exfoliation of the mucous membrane at the menstrual period) might be considered here, as its pathology is most nearly allied to endometritis; from its peculiar symptoms, however, it is better to consider it in the chapter on Dysmenorrhœa (Section VIII.).

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[1] Archiv f. Gyn. XX. S. 455.

[2] Op. cit.

Leucorrhœa[1] is a frequent symptom. The secretion from the body of the uterus is of a watery character, less dense and gelatinous than that from the cervix; usually, however, there is cervical catarrh as well. The uterine secretion has an alkaline reaction, while vaginal leucorrhœa is acid. Sometimes it is tinged with blood, producing an appearance which Bennet compared to the rust-coloured sputum in pneumonia. The blood-stained leucorrhœa must not be confounded with the menstrual flow. In some cases the discharge is purulent, accumulates in the uterine cavity, and is only discharged at intervals.

"*Weakness in the back*" is the common complaint made by the patient. It may amount to actual pain, but more generally it shows itself as feebleness or weariness which incapacitates the patient for her daily work.

Derangements of the digestive and nervous systems invariably follow when the disease has become chronic. There is impaired digestion with loss of appetite, and, as the result, general debility. Whether these are due to the drain on the system produced by the leucorrhœa or to the close connection between the nervous centres for the sexual organs and those for the digestive apparatus, we do not know. Derangements of the nervous system show themselves in frontal headache and depression of spirits amounting sometimes to melancholia.

Anœmia, with its characteristic train of symptoms, is the leading symptom in the hæmorrhagic type (*Olshausen*).

Sterility is frequently present, and has been in certain cases the only symptom complained of. The secretion may destroy spermatozoa, may mechanically prevent them from passing upwards, or the villi of the fertilised ovum may be prevented from finding an attachment in the diseased mucous membrane. Again, the ovum is attached for a time but, from the imperfect formation of the uterine portion of the placenta, *abortion* takes place; repeated abortion is characteristic in chronic endometritis. A vicious circle is thus produced: as mentioned under etiology, endometritis frequently follows abortion; abortion, in its turn, frequently follows endometritis.

PHYSICAL SIGNS.

A. *Of Acute Endometritis.*

There is tenderness on pressure over the lower part of the abdomen due to peritonitis which generally accompanies the acute form. On vaginal examination the cervix is found to be swollen and puffy, the os is dilated and feels velvety from eversion of the mucous membrane, the Bimanual is unsatisfactory from sensitiveness to pressure. The speculum shows the vaginal portion to be congested, with catarrhal patches round the os and the follicles enlarged and sometimes containing pus. The leucorrhœal discharge already described is seen coming from the os uteri. The sound should not be used, as its introduction causes pain and sometimes hæmorrhage.

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[1] We mention this as a symptom usually given, although proof is wanted that the secretion from the *uterine* mucosa is increased in Endometritis—it may be entirely cervical.

B. *Of Chronic Endometritis.*

Tenderness on pressure is not necessarily present, though we frequently find it as the result of complications—peritonitis, cellulitis, ovaritis.

On vaginal examination the vaginal portion of the cervix is normal, or has the characters described under cervical catarrh. The Bimanual shows the uterus to be *enlarged;* it is soft and flabby so that its form cannot easily be made out, or of a firm consistence from chronic metritis.

The sound passes *beyond* the 2½-inch knob to a varying extent, and on withdrawal is frequently tinged with blood. Its introduction may be difficult from irregularities in the mucous membrane, and is sometimes painful. In some cases pain is complained of when the sound touches the fundus of the uterus, which some consider characteristic of endometritis. Routh has described a variety of the disease under the name "Fundal Endometritis," in which this is prominent: on forcible pressure of the sound against the fundus "absolute agony may result, which may produce vomiting, an hysterical faint or fit, sometimes a regular epileptic fit." The sound is most useful in demonstrating *irregularities of the mucous membrane*, and their recognition is of great importance: to detect these the sound is held lightly between the finger and thumb and moved slowly backwards and forwards over the mucous membrane; a grating or catching sensation is felt when they are present. We must note, however, as Olshausen points out, that the spongy irregularities may escape detection by the sound.

In the speculum we see, issuing from the os, the leucorrhœal discharge with the characteristics given above; usually it is mixed with that from the cervix. The appearances described under cervical catarrh are also frequently present.

DIAGNOSIS: DIFFERENTIAL DIAGNOSIS.

Value of microscope in diagnosis.

The curette is invaluable in diagnosis, especially when its use is followed by *microscopical examination* of the scrapings—the importance of which here cannot be overrated.

This throws light on the etiological question, whether the endometritis be due to incomplete emptying of the uterus after *parturition?*

In such a case we find among the scrapings large decidual cells or fragments of the villi of the chorion in a state of fatty degeneration.

It enables us to differentiate endometritis from commencing malignant disease—*carcinoma* and *sarcoma*. In carcinoma we see under the microscope abundance of epithelial cells of irregular form and with many nuclei (*v.* fig. 285). In sarcoma we see under the microscope the typical round or spindle-shaped cells. The hæmorrhagic type of endometritis may readily be mistaken for sarcoma uteri, because "it spreads in a diffuse manner, pre-eminently causes hæmorrhage, produces pain not at all or only late" (*Olshausen*). The microscope, however, settles the diagnosis. Care must be taken not to mistake the small-celled infiltration of the tissue (fig. 193) for round-celled sarcoma. The cells of the latter are characterised by their larger size and oval nuclei (*v.* figs. 301 and 302).

PROGNOSIS.

Endometritis is not a fatal disease in itself, though, when long protracted, it seriously affects the constitution and produces permanent ill-health. In cases of excessive hæmorrhage, the condition becomes grave.

The treatment is often protracted, and the patient should always be warned of this. The occurrence of conception will produce the most favourable conditions; and, if due care be taken to prevent abortion in the early months, and in the management of the puerperium, we may hope for a cure.

When endometritis is associated with a strumous, tubercular, or syphilitic diathesis, it may baffle all our efforts.

TREATMENT.

A. *Of Acute Endometritis.*

Treatment of Acute Endometritis.

Rest in bed, warm fomentations over the abdomen, and the free use of opium if there is much pain, form all the treatment required. Should the bowels not be moved freely before the attack, castor oil with an enema should be given since the loaded rectum presses injuriously on the inflamed uterus. Should the bowels not be loaded, the patient is not to be troubled with purgatives but rather kept under the influence of opium. If there is menorrhagia, ergot is required; when the discharge is free, it is to be given hypodermically. Warm water injections should not be used until the acute stage is passed, the pain and other signs of inflammation have subsided, and the leucorrhœa is abundant.

B. *Of Chronic Endometritis.*

Of Chronic Endometritis.

Prophylactic treatment is of great importance. A patient who is subject to endometritis should guard against exposure during the menstrual period. When conception takes place, the practitioner should remember the liability to abortion, the importance of seeing that the uterus be thoroughly emptied after parturition, and that the patient take proper care during the puerperium; in the latter period, ergot is beneficial.

We begin with hot-water injections, and the administration of ergot; this is given as the liquid extract (twenty drops in water three times a day, increased to thirty at the menstrual period) or ergotin—four grains in pill, daily.

Curetting of Uterus.

If the uterine cavity be enlarged so that the sound moves freely within it, if there be roughness of the endometrium, or if there has been a recent miscarriage or confinement, we employ the *curette followed by the application of carbolic acid.* In the last class of cases the cause of the endometritis has been the incomplete separation of the placental villi; if treated while still recent, such cases furnish the most satisfactory instances of an immediate and complete cure.

Curetting should not be performed while active cellulitis or peritonitis is present. The fixing of the uterus by adhesions or cicatrisation does not contra-indicate the operation, though these render it more difficult through preventing the uterus from being drawn down by the volsella; when they are present, undue traction must not be made. The time selected for operation is a week after a menstrual period; when the discharge is continuous, the period is indicated by increase in amount.

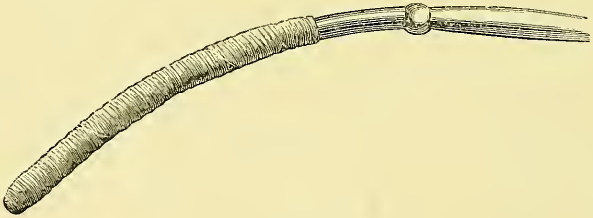

Fig. 196.

Sound Dressed with Wadding for the application of Carbolic Acid.

Curetting of the Uterus with application of Carbolic Acid. The following instruments are necessary:—

Sims' or Battey's speculum,
Three or four sounds dressed with cotton wool,
Volsella,
Curette,
Crystals of carbolic acid liquefied,
Cotton wadding and glycerine,
Mackintosh.

Chloroform is not necessary unless the patient be nervous.

The sounds should be covered with a thin layer of cotton wool, extending almost to the knob (fig. 196). The sound is dressed as follows :—A film of cotton wadding is laid on the palm of the left hand, the last two and a half inches of the sound are moistened and pressed firmly on the cotton wadding, the left hand is closed over it, the sound is turned twice or thrice round within the shut hand till the cotton wadding becomes tightly rolled on. The dressing must bite the sound firmly so that it may not come off within the uterine cavity, and must not be too thick to be easily carried in. To remove the cotton wadding afterwards, the dressing is unrolled under water.

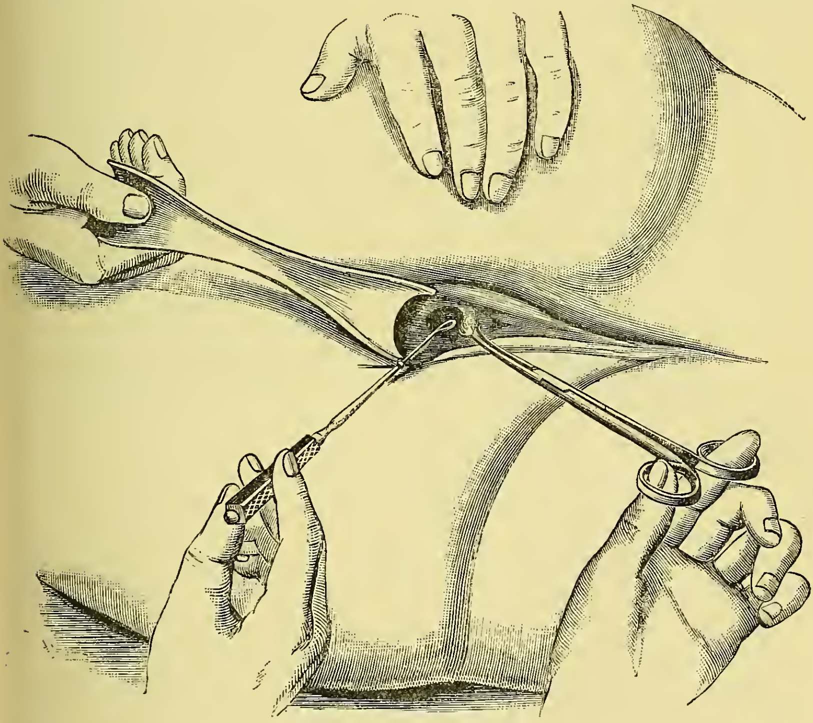

FIG. 197.

UTERUS DRAWN DOWN WITH THE VOLSELLA AND CURETTE IN POSITION. The speculum is held and the labium drawn upwards by an assistant. The operator's hands are crossed (*A. R. Simpson*).

Thomas' dull-wire curette (fig. 100) has the advantage of being, from its small size, easily passed; but it is not strong enough, so that the steel curette is preferable—Martin's (fig. 101) being the best. The crystals of carbolic acid are kept in stoppered bottles, at the ordinary temperature a portion remains liquid; tincture of iodine, strong nitric acid, or chromic acid may be substituted for it.

The patient is placed semiprone; Sims' speculum is passed and held by an assistant who with the left hand draws back the upper labium (fig. 197) — if there be no assistant, some form of self-retaining speculum is used; the vagina is washed out with carbolised water. The anterior lip is laid hold of with the volsella and drawn downwards, the volsella being steadied with the fingers of the left hand; the curette is taken in the right hand, dipped in carbolised oil (1-20), and carried into the uterine cavity (fig. 197). The anterior wall of the uterus is first scraped from the fundus downwards; only slight pressure on the instrument is made, unless it be felt to slip over the irregularities of the mucous membrane without removing them; the detached fragments are brought down to the cervix with a raking motion, and set aside for microscopical examination: the posterior wall is scraped in the same way. A sound, dressed with dry cotton wadding, is passed to clear away the blood and mucus; the same process is immediately repeated with a second, and with a third if necessary. A reserve sound, previously dipped in the carbolic acid so as to be ready for use, is carried in immediately after the last of these has been withdrawn; if there is much bleeding or the uterine cavity is large, a second application should be made; our aim is to apply the carbolic acid to the whole of the raw surface, without its being diluted with blood or mucus. The volsella being withdrawn, a pledget of cotton wadding soaked in glycerine is placed in the upper part of the vagina so as to embrace the cervix; this prevents the carbolic acid from running down into the vagina.

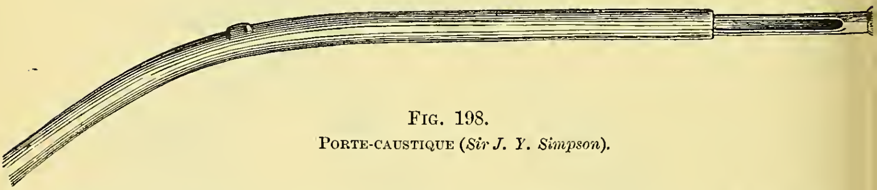

FIG. 198.
PORTE-CAUSTIQUE (*Sir J. Y. Simpson*).

The patient keeps her bed for a week after the operation, the pledget having been removed on the second day. Special care should be taken at the next menstrual period.

Doléris [1] has recently insisted on the advantage of carbolic acid above all other applications to the endometrium, because while it destroys thoroughly diseased tissue it does not leave a slough. It also soaks further in than strong acids which coagulate the albumen and have only an action limited to what they touch.

Endometric Applications.

Applications without a previous curetting may be made in cases where there is no history of recent parturition or where the symptoms (menorrhagia) are slight. In all other cases the preliminary use of the curette is a distinct advantage, as it removes the fungosities and thus allows the caustic to act more efficiently. Iodised phenol,[1] introduced by Battey, is a very useful and safe application.

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[1] He uses a solution 1 in 2 or 3 of glycerine, and mentions three hundred and thirty-nine cases which he has treated by the application of carbolic acid alone or by curetting followed by carbolic acid, with very satisfactory results. Op. cit., p. 195.

Atthill's Method.

Atthill advocates the use of strong nitric acid, and the preliminary dilatation of the cervix with tents so as to allow a thicker dressing of the sound and more abundant application of the acid. He uses an intra-uterine speculum of vulcanite which is passed within the cervix; this prevents the acid from acting on the cervical canal.

Solid Applications.

The application may be made in a *solid form*, of which the best is nitrate of silver. This is employed as follows: the nitrate of silver is fused in a watch-glass over a spirit flame; a probe with a roughened end is dipped in this and the film allowed to cool, and then dipped again repeatedly till several layers are deposited.[2] Sir James Simpson applied the nitrate of silver in powder on the porte caustique represented at fig. 198. The simplest way is to carry an ordinary quill with a nitrate of silver point into the cavity of the uterus; it may be passed in and withdrawn again, or held there till the point melts off; Credé of Leipsic has got very good results from this mode of treatment. Barnes has devised an ointment positor for introducing ointments or fluids; he applies the iodide of mercury ointment in this way, and also tincture of iodine on a sponge. Iodoform has also been recently recommended by Kugelmann,[3] the powder being blown in through a curved metal catheter. Iodoform gauze has also been found useful by Polk[4] in treating endometritis, especially the hæmorrhagic form; the cervix is dilated and the uterus washed out and then packed, the gauze being removed in twenty-four hours and if necessary re-introduced.

Electricity has been used in endometritis as in other chronic inflammations; this will be considered when the whole subject of Electricity in Gynecology is dealt with in the Appendix.

The importance of constitutional treatment must not be forgotten. The bowels should be moved regularly by saline aperients; the aloes and iron pill is also useful. The preparations of quinine, iron, and strychnine, are valuable in improving the tone of the nervous and digestive systems.

Cold baths and sea-bathing aid greatly in strengthening the constitution. The water of certain mineral springs, such as Ems and Kreuznach, seems to have a special action on the uterine as on other mucous membranes. The regular diet and exercise required at these baths have also, no doubt, their beneficial effect.

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[1] Robert Bell in a paper read recently at the British Gynecological Society recommends it strongly —the proportions being 320 grs. of iodine dissolved in eight ounces of liquefied carbolic acid: Brit. Gyn. Trans., 1888, p. 189.

[2] Foulerton recommends a bougie made of fine wire twisted spirally and coated with nitrate of silver or iodoform—Lancet, Dec. 1888.

[3] Centralb. f. Gyn., Bd. IX., S. 648.

[4] Amer. Jour. Obs., 1888, p. 1052.

The diathesis—strumous, tubercular, or syphilitic—should not be forgotten. In them, the treatment must from the first be constitutional.

Intra-uterine Injections.

Intra-uterine injections. Applications to the interior of the uterus are also made in the form of a fluid injected with a syringe. The nozzle of the latter is shaped like a sound, so that it may be passed into the uterine cavity; the barrel is of glass, and is graduated (like a hypodermic syringe) so that the quantity injected (not more than a few minims) is exactly known. The solutions used are carbolic or chromic acid, tincture of iodine or perchloride of iron, nitrite of silver, and sulphate of iron or copper. The cervix must be well dilated, to allow the fluid to escape readily past the nozzle of the syringe. To facilitate this reflux, syringes have been devised with a double canula. Injection of fluid *into the non-puerperal uterus* is not unattended with risk [1] (*v.* p. 194), and the fact that we have the equally effective and perfectly safe method of intra-uterine medication described above renders it unnecessary. As a means of treating endometritis it is condemned by the general opinion of gynecologists in this country and America; in France and Germany, however, it is extensively practised.[2]

A new method of *dilating the uterine canal for therapeutic purposes* was recently brought before the French Academy of Medicine by Vulliet,[3] and was referred to a special committee who reported favourably on it. It consists in packing the uterus with tampons, varying in size from a pea to an almond, saturated in an ethereal solution of iodoform; the tampons are removed after forty-eight hours and a fresh series inserted, and the operation is repeated eight or ten times until the cavity has become so dilated that it can be explored through its whole length with a speculum, and applications made more thoroughly than after any other method of dilatation.

Taylor of Birmingham has devised an "artificial amnion" (a finger-stall of pure rubber, carried in on a hollow sound and distended with air) for dilating the cervix previous to making applications to the interior of the uterus, and its use as a preliminary to intra-uterine medication has been advocated by Park.[4]

[1] A fatal case has been recorded in the *Lancet*, April 16, 1887.

[2] For further details of this method the student may consult the following references: *Klemm*—Die Gefahren der Uterininjection," Leipzig, 1863; *Cohnstein*—"Beiträge zur Therapie der chronischen Metritis," Berlin, 1868; *Leblond*—"Manuel de Gynécologie," p. 220, Paris, 1878; and *Hegar und Kaltenbach*—"Operative Gynäkologie," S. 104, Stuttgart, 1881.

[3] Archiv. de Toc., Oct. 1886.

[4] Edin. Med. Journ., Sept. 1887.

CHAPTER XXXII.

METRITIS, ACUTE AND CHRONIC: SUBINVOLUTION.

LITERATURE.

Barnes—Diseases of Women, p. 507: Lond. 1878. *Bennet, J. H.*—Practical Treatise on Inflammation of the Uterus: London, 1853. *Byford*—Medical and Surgical Treatment of Women: Philadelphia, 1881. *Courty*—Diseases of Women (Dr. Agnes MacLaren's Translation: Lond. 1882). *De Sinéty*—Manuel de Gynécologie, pp. 315 and 351, Paris, 1879. *Fritsch*—Die chronische Metritis: Billroth u. Luecke's Handbuch f. Frauenkrankheiten, Stuttgart, 1885. *Gallard*—Traitement de la Métrite Chronique: Bull. gén. de thérapeut. etc., 1879, T. XCVII. 4—12, liv. *Guérin*—Ann. de Gyn., 1878, Tom. II. p. 9. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane, S. 124: Leipzig, 1878. *Scanzoni*—Die chronische Metritis: Wien, 1863. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane, S. 84: Leipzig, 1879. *Simpson, Sir J. Y.*—Diseases of Women, p. 585: Edin. 1872. *Thomas*—Diseases of Women, p. 307: Philadelphia, 1880. See also Index of Recent Gynecological Literature in the Appendix.

Definition.—Inflammation in the muscular coat of the uterus leading, when chronic, to increased formation of connective tissue.

ACUTE METRITIS.

PATHOLOGY.

The uterus is enlarged and may be of the size of a goose's egg; it is thickened, specially antero-posteriorly, and of a doughy consistence. The peritoneal surface is usually covered with lymph.

On section the muscular wall is thickened, but soft and pulpy; the cut surface is of a bright red colour, shows the veins to be engorged, and yields on compression a yellowish-red exudation. The mucous membrane is thickened and vascular, but the cavity of the uterus is not altered in size. Microscopically, the muscular bundles are infiltrated with pus corpuscles.

ETIOLOGY.

Acute metritis is produced by extension of inflammatory action from the mucous or serous lining of the uterus to the intervening muscular tissue. It occurs most commonly as part of the general inflammation produced by absorption of septic matter during the puerperium. It also arises from exposure to cold at a menstrual period—the active congestion passing readily into acute inflammation—from gonorrhœal infection and immoderate sexual activity.

Frequently, it is the result of surgical interference:—careless use of sound, intra-uterine injections, pessaries and sponge-tents; scraping the uterus, the removal of submucous fibroids, operations on the cervix.

SYMPTOMS.

There is fever and general constitutional disturbance varying with the intensity of the inflammation. The onset may be marked with rigors. There is a sensation of fulness, weight, and burning heat in the pelvis; pain in the hypogastric and sacral regions, aggravated on movement of the body or the emptying of the bladder and rectum; nausea and vomiting, diarrhœa and tenesmus of rectum and bladder.

Menstruation is suppressed in those cases where the metritis is occasioned by exposure to cold at the menstrual period. In other cases, it is diminished in amount; exceptionally, there is menorrhagia.

PHYSICAL SIGNS.

There is tenderness on pressure in the hypogastric region. On vaginal examination, the vaginal walls are hot and dry, the cervix is swollen and movement of it causes pain. The bimanual examination cannot be made on account of the pain and the resistance of the abdominal walls; if the patient be put under chloroform, the uterus will be felt to be enlarged but freely movable unless fixed by old adhesions (fig. 114). The sound should not be used, as it causes hæmorrhage from the vascular mucous membrane.

PROGRESS AND TERMINATION.

The acute symptoms do not last usually more than a week. The fever and pain diminish; there is less heat in the pelvis and vagina, and leucorrhœal discharge becomes free. As complications, there may be catarrh of the bladder, rectum, or vagina.

The acute *usually* passes into the chronic stage to be immediately described; though *sometimes*, under proper treatment and care, there is resolution with absorption of the exudation; rarely does it terminate in abscess formation. Circumscribed abscesses in the uterine walls—recorded by Scanzoni, Reinmann, Bird, Ashford, Schroeder, Macdonald, and others—are sometimes produced and burst into the uterus itself; or adhesions may form and perforation take place into the bladder, vagina, rectum, and intestines, or even through the abdominal walls.

DIAGNOSIS.

The diagnosis that there is acute metritis and *nothing more*, is a refinement to which few would lay claim. But if the symptoms and physical signs are as described above, if the uterus be freely movable and no deposit is felt in the fornices, we may conclude that acute metritis is the prominent lesion. The possibility of abscess-formation should be kept in view. The practitioner may also, though very rarely, see cases where there is acute metritis and endometritis, and nothing else. It is wrong to say that acute metritis is rare. It is often a complication of pelvic peritonitis and cellulitis, with the physical signs masked by these latter diseases.

PROGNOSIS.

The *immediate result* will depend on the extent to which the peritoneum is involved. Even when the attack is not severe, the liability to pass into a chronic intractable condition makes us guarded in giving an opinion as to *complete recovery.*

TREATMENT.

Intra-uterine Injections.

If the metritis is supposed to be due to a septic cause, the first measure indicated is the *removal of that cause.* Thus if it come on during the puerperium, if the lochia are fœtid and we suspect that a portion of the placenta has been retained, the uterine cavity should be washed out with an injection of 1 to 40 carbolic or 1 to 4000 corrosive sublimate solution. Great care must be taken not to introduce air with the injected fluid.

In all cases of metritis, the patient must be kept *at rest.* This is done by keeping her recumbent. The bowels are evacuated by an enema—not by purgatives—followed by a morphia suppository. Pain is relieved by warm fomentations, to which turpentine may be added, applied over the lower part of the abdomen; but if it be severe, the patient should be kept under the influence of opium as already described in the treatment of pelvic peritonitis. If the temperature be above 102°, quinine should be given—10 grains every two or three hours—till it falls. The sulpho-carbolate of soda (15 grains) is useful in some cases.

CHRONIC METRITIS.

Synonyms.—Chronic parenchymatous inflammation (Scanzoni), Subinvolution (Sir J. Y. Simpson), Diffuse proliferation of connective tissue (Klob), Infarct (Kiwisch), Areolar hyperplasia (Thomas).

There has been great divergence of opinion among gynecologists as to the term which should be applied to the changes occurring in chronic metritis. Virchow describes the process as a hyperplasia of fibromuscular tissue, and places chronic metritis alongside of fibroid tumours of the uterus. Klob classes it among the new formations, and characterises it as "die diffuse Bindegewebswucherung"—"diffuse proliferation of connective tissue." Thomas calls it "Areolar Hyperplasia," and Noeggerath has suggested the term "diffuse *interstitial* metritis."

From a *pathological point of view* the term "metritis" is incorrect, because there has never been demonstrated a chronic inflammation of the muscular fibre of the uterus. The morbid process described as chronic metritis consists in an *increase of connective tissue* out of proportion to that of the muscular fibre, which remains normal or is but slightly increased in quantity. We are not yet in a position to propose a term resting on a sure pathological basis; to do this would require a complete knowledge of the pathological changes, which has not yet been attained. We prefer to retain the term "chronic metritis."

From a *clinical point of view*, this term is very convenient, including a variety of cases of different origin but presenting the same clinical features on examination.

It may be objected that to apply the term "chronic inflammation" to *the process* is misleading, as it implies a previous acute stage which is rarely present; the process would be more correctly described as an increased connective-tissue formation dependent on long-continued hyperæmia. But the term chronic inflammation is applied to the process producing similar changes in other organs, as cirrhosis of the liver; chronic metritis produces, in fact, cirrhosis of the uterus.

Subinvolution of Uterus.

We have brought "subinvolution of the uterus" under this head, though in other English text-books it is treated as a separate lesion. The term subinvolution is *etiological* and simply expresses one mode, the most important one, in which the condition to be described is produced. *Apart from the history*, it is not possible to diagnose between a subinvoluted uterus and one enlarged by chronic metritis alone. Further, the condition of subinvolution is maintained by the process of chronic metritis, that is, by the formation of connective tissue which takes the place of the muscular fibre. Finally, the treatment is the same in both cases.

PATHOLOGY.

The condition of the uterus depends on the duration of the disease. At an early stage (as in cirrhosis of the liver) the organ is enlarged, hyperæmic, and soft; at a later period it is indurated, anæmic, and hard. The peritoneal surface is of normal colour, or shows here and there patches of extravasated blood. The enlargement is uniform, so that the shape of the uterus is not altered.

On section, the tissue is soft and hyperæmic in the early stage; firm, cartilaginous, and of a whitish colour (from the compression of the capillaries by the cicatricial tissue) in a later stage. The uterine walls are increased in thickness. The uterine cavity is increased in size.

De Sinéty.

"In the first period," says De Sinéty,[1] "the dominant lesion is the presence in great number of embryonic elements throughout the whole thickness of the muscular wall. These elements are met with specially round the blood-vessels or form islands of variable dimensions which are more or less apart." The second period is characterised by two changes: (1) Marked dilatation of the lymphatic spaces, and (2) a localised hyperplasia of the connective tissue round the blood-vessels (fig. 199). The sclerosis, for such it may be called, differs from a similar change in the kidney or liver in the fact that the formation of connective tissue is localised round the blood-vessels. In the case described by De Sinéty, he says that it was difficult to say whether the muscular tissue was normal or diminished in quantity.

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[1] Gynécologie, p. 354.

Fritsch.

Fritsch[1] has examined uteri, extirpated for cancer, which showed the naked-eye characters of chronic metritis. He notes the following pathological changes. (1) The disposition of the muscular fibre and connective tissue is less regular than in the normal uterus, and the latter is increased in quantity. (2) The blood-vessels are more numerous and more tortuous; the lumen of the vessel is often diminished; the tunica media is thickened; the contour of the vessel is masked through a connective tissue degeneration of its wall. (3) The lymphatic spaces appear gaping instead of as narrow clefts. (4) The peritoneum is thickened.

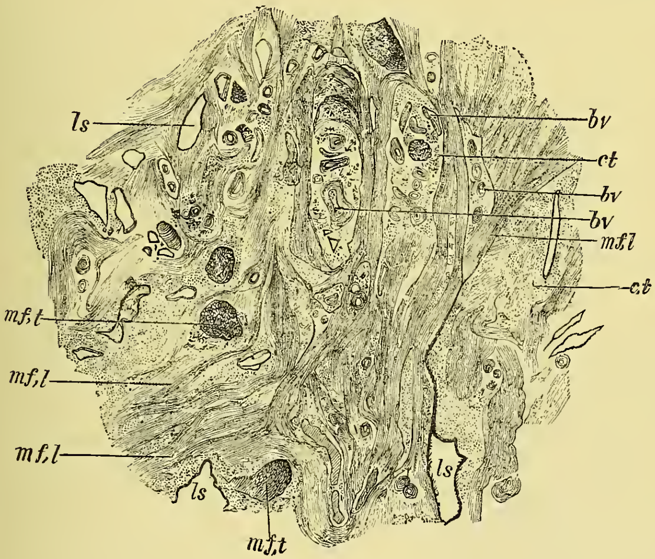

FIG. 199.

SECTION OF THE UTERINE TISSUE IN A CASE OF CHRONIC METRITIS $\frac{40}{1}$. *e t* connective tissue round the blood-vessels *b v*; *l s* dilated lymphatic spaces; *m f*, *l*, muscular fibre cut longitudinally; *m f*, *t* muscular fibre cut transversely (*De Sinéty*).

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[1] Luecke u. Billroth's Handbuch f. Frauenkrankheiten, Stuttgart, 1885, S. 917.

SnowBeck. Snow Beck[1] also describes the presence of "an increased amount of round and oval globules, with amorphous tissue in the uterine walls." The increase in the size of the uterus is due to the presence of the soft tissue rather than to an increase in the muscular fibre.

ETIOLOGY.

The causes of chronic metritis may be arranged under two heads:—

A. Causes which operate through interference with the normal involution of the puerperal uterus;

B. Causes which operate through the production of repeated or protracted congestion of the uterus.

A. *Causes which operate through interference with the normal involution of the uterus.*

(1.) Retention of portions of placenta, membranes, or blood-clot in the uterus;
(2.) Lacerations of the cervix uteri;
(3.) Pelvic inflammations, occurring after labour;
(4.) Rising too soon after delivery;
(5.) Non-lactation;
(6.) Repeated miscarriages.

Puerperal Involution. In the process of involution there are two factors, the fatty degeneration of the muscular fibre and the removal of the products of this degeneration. The condition of permanent enlargement or subinvolution is not due to the non-degeneration of muscular fibre, but to the substitution of connective tissue for the products of this degeneration. This seems to be the reason why the process of chronic metritis is met with more frequently in those who have borne children. John Williams[2] made the interesting observation that involution was distinctly retarded by removal of the ovaries.

Any source of irritation in or beside the uterus leads to chronic metritis; in this way we explain the effect of the *retention of portions of placenta or membranes.* An extensive *laceration of the cervix*, Emmet says, favours subinvolution for a similar reason. Continued *cellulitis or peritonitis* acts in the same way, or through interference with the circulation. If the patient *rise too soon*, the increased weight of the non-involuted uterus leads to passive congestion and formation of connective tissue. Passive congestion will, on the other hand, be diminished by whatever produces uterine contractions; the physiological stimulus of suckling, excited reflexly through the mammæ, favours involution; in *non-lactation* this stimulus is absent. *Abortions* are an important cause; because patients do not take so much care of themselves as after a full-time labour, and the stimulus of lactation is absent. After abortion, conception readily takes place before the uterus has returned to its normal size, and this favours a recurrence of abortion.

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[1] Lond. Obst. Trans., vol. xiii., p. 239.

[2] Lancet, July 26, 1884.

B. *Causes which operate through production of repeated or protracted congestion.*

(1.) Displacements of the uterus;
(2.) Pressure of tumours in or near the uterus;
(3.) Causes producing increased flow of blood to the uterus, *e.g.* endometritis or too free use of caustics.

SYMPTOMS.

In the great proportion of cases, the patient *dates her suffering from a confinement;* frequently there is a history of repeated abortions. The patient finds, on rising after the puerperium, that she does not regain her former strength. There is weakness in the back amounting in more severe cases to pain, a sensation of weight and bearing-down in the pelvis and of want of power in the limbs.

Menstruation is irregular and often increased in frequency and quantity, though this is more characteristic of endometritis. There is leucorrhœa from accompanying endometritis or cervical catarrh.

Effect on Reproduction.

The *reproductive function* is variously affected. Before the structure of the uterus has become permanantly altered, pregnancy followed by early *abortion* may repeatedly happen. The cause of the abortion is probably the alteration which is taking place in the structure of the mucous membrane, rendering it unfitted for the development of the placenta; after an abortion, the conditions are peculiarly favourable for a second conception even before the uterus has had time to undergo involution; an excessive development of connective tissue gradually renders the uterus incapable of involution, and thus the condition of subinvolution is perpetuated. Should the pregnancy go on to full time, the presence of an undue proportion of connective tissue in the uterine wall leads in the third stage of labour to atony of the uterus and retention of the placenta; see an interesting case of this reported by Kaschkaroff,[1] who gives the result of his microscopic investigation. After the condition has existed for some time, there is *sterility.* This is due not so much to the changes in the uterus itself, though the leucorrhœa may prevent fertilisation, but to the ovaritis or pelvic peritonitis which is usually superadded; ovulation may be prevented by change in the structure of the ovary or by its being bound down by adhesions; the Fallopian tubes may be obstructed by cicatricial contractions.

The general constitutional derangements are very important, and it is on account of these that the patients usually seek advice. Chronic metritis is the most important of all the diseases of women; the suffering of the patient in cases of displacement of the uterus is due not so much directly to the displacement as to the chronic inflammation secondary to it.

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[1] Centralblatt für Gynäkologie, No. 5, 1879.

PHYSICAL SIGNS, DIAGNOSIS.

The uterus is *equally* enlarged; there is no alteration in its form. The character of the enlargement is best understood by contrasting it with that due to pregnancy. In the second or third month of pregnancy, there is antero-posterior enlargement of the uterus; the vaginal finger comes on the anterior wall springing out from the cervix; the abdominal hand feels the rounding out of the fundus, combined with a softness which prevents us from distinctly defining its outline. In chronic metritis the vaginal finger does not feel any bulging of the anterior wall, and the abdominal hand recognises the fundus to be uniformly thickened; the outline of the latter may be felt with unusual distinctness through the greater firmness of the uterine tissue.

The enlarged uterus may be in its normal position, and freely movable or fixed by adhesions; it is often retroflexed.

The sound passes more than the 2½ inches; it passes *readily*, and is felt to be freely movable in the uterine cavity.

DIFFERENTIAL DIAGNOSIS.

The conditions which are most liable to be confounded with chronic metritis are *early pregnancy* and *small fibroid tumours*.

Diagnosis of early Pregnancy.

In a case of early pregnancy, the "having passed a period" will put us on our guard; some patients, however, menstruate after conception. Discolouration of the vagina points to pregnancy, but is often not marked. The softening of the cervix is a more reliable sign, less reliable should pregnancy occur in a uterus which has undergone changes of chronic metritis. Our only sure guide is the bimanual examination, which shows us the change in the form and consistence described above. When the abdominal muscles are resistant, the finger can recognise per rectum the bulging and softness of the posterior uterine wall. The interesting question suggests itself in this connection, how soon it is possible to recognise the changes in the uterus peculiar to pregnancy? *How soon can we diagnose pregnancy?* Before auscultation was known the first reliable signs were fœtal movements; the date at which the mother first recognised these varied indefinitely. Auscultation gave us an earlier and more reliable indication in the sounds of the fœtal heart; these cannot be heard before the fourth month. The bimanual examination enables us to detect pregnancy from the eighth to the tenth week. We have under very favourable circumstances diagnosed it at the fifth week, and the subsequent history has confirmed our diagnosis.

For the differential diagnosis of chronic metritis from small fibroid tumours, we refer the student to the "Diagnosis of Small Fibroid Tumours" (Chap. XXXVI.).

TREATMENT.

Our first object is to diminish the passive congestion of the pelvic organs. The patient should be instructed to lie down for a few hours every day. Sedentary occupations or those that require the patient to stand for a long time in one position should be avoided. While enjoining a certain amount of rest, we must remember that rest becomes injurious when it interferes with nutrition. A certain amount of exercise, especially in the open air, should be as emphatically prescribed as a certain amount of rest.

Passive congestion is also diminished by giving local support to the uterus by a Hodge pessary; where the vagina is roomy, a soft ring pessary sometimes answers better.

The pelvic circulation is stimulated by vaginal injections; hot water will generally be found to be the most valuable; cold water is a more effectual stimulus, but few patients can stand it. The vaginal injection should be employed just before going to bed; the douche is preferable to Higginson's syringe (*v.* page 137). The injection should be continued from ten minutes to a quarter of an hour. It is a decided advantage to have the douche given with the patient in the *dorsal posture*, as Gallard recommends. Occasional warm baths are useful in some cases; when the patient is in the bath, the vaginal douche can be used at the same time with greater freedom and effect. A cold hip-bath every morning is the best stimulus to the circulation. *Medicinal baths* have a peculiarly beneficial effect in chronic metritis. Amongst those the first place has always been held by Kreuznach, the waters of which are specially rich in bromides and iodides. The baths at Kissingen are rich in carbonates, and are of a lower temperature than those of Wiesbaden and Baden-Baden which contain a smaller proportion of salts.

Mineral Waters in Chronic Metritis.

Further, the *drinking* of medicinal waters is also beneficial. The mineral springs at Ems and Vichy have, from their action upon the mucous membrane, always had a great reputation for the treatment of chronic uterine inflammation. Where there is much catarrh, they are specially serviceable. In scrofulous and chlorotic individuals, the advantage of waters which are rich in salts of iron is evident. Comparatively few of our patients, however, will be able to enjoy the luxury of a course of treatment at one of these watering-places; but much benefit will be derived from change of air to the sea-side, or to the regular regime and cheerful surroundings of a hydropathic.

Attention to the action of the bowels is all important. Accumulations in the rectum and sigmoid flexure of the colon favour passive congestion, and interfere with the appetite and digestion. The mineral waters—Friedrichshall, Carlsbad and Hunyadi Janos—are the best aperients.

The Carlsbad salts are specially useful in bilious patients; a teaspoonful should be dissolved in a tumberful of water and drunk in repeated sips during the morning. Friedrichshall and Hunyadi Janos waters act best mixed with an equal amount of hot water; their dose varies from a wineglassful to a tumblerful. A good substitute for these waters is the tonic and aperient prescription given on page 206.

Ergot (twenty drops of the liquid extract thrice daily, increased to thirty at the menstrual period) and the Hydrastis Canadensis (same dose of its liquid extract) are very useful, especially when there is menorrhagia.

The iodide and bromide of potassium may also be given internally, as recommended at page 204.

Great care, and in some cases complete rest, should be enjoined at the menstrual period. As exacerbations usually occur at these times, a great deal is done towards a cure by prophylactic measures in regard to this.

Blistering of Cervix.

Of local treatment the most important is *counter-irritation* by occasional blistering or repeated application of iodine or of croton oil to the iliac regions. French gynecologists recommend the application of the blistering fluid to the cervix; we have had no experience of this method. Thomas speaks highly of it, and practises it in the following way. A large cylindrical speculum is passed, and the cervix cleansed and dried with a pledget of cotton. The preparation of vesicating collodion, made with acetic acid, is painted in two or three coats over the whole of the vaginal portion; after it has dried, a stream of cold water is applied to wash off any superfluous collodion. In eight or twelve hours there is a free discharge of serum. The patient remains quiet for some days, and uses occasional warm-water injections; a pledget of cotton wadding soaked in glycerine is applied afterwards. Many gynecologists apply iodine to the cervix and roof of the vagina; Scanzoni recommended a solution of 4 grs. of iodide of potassium in 30 mm. of glycerine. The simple tincture of iodine, or a solution of equal parts of iodine and glycerine, may also be applied in this way. *Local depletion* by scarification or leeches, as described under Endometritis, is less frequently employed than formerly.

In speaking of Emmet's operation, we mentioned that it was sometimes followed by diminution in the size of the uterus. Carl Braun[1] has shown that after *amputation of the cervix* for hypertrophy the uterus sometimes undergoes changes which resemble those which occur physiologically in the puerperal uterus. Martin of Berlin strongly recommends the amputation of the posterior lip; in a paper read before the German Scientific Association at Cassell, he gives the results of the operation in

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[1] Zeitschr. d. Ges. d. Wiener Aerzte, 1864, S. 43.

72 cases in all of which the uterus was stimulated to undergo involution.

Electricity has also been recommended by Apostoli for chronic metritis; it is more properly a treatment of endometritis, as it is to its cauterising action on the mucous membrane that beneficial results are due. Weir Mitchell's method of treatment by feeding and massage has given good results where the constitutional weakness has been the chief source of trouble. Both of these will be considered in the Appendix.

CHAPTER XXXIII.

DISPLACEMENTS OF THE UTERUS: ANTEFLEXION; ANTEVERSION; RETROVERSION; RETROFLEXION.

LITERATURE.

Bandl—Ueber die normale Lage u. s. w.: Archiv für Gyn., XXII. 408. *Bantock*—On the Use and Abuse of Pessaries: London, 1884. *Barnes*—Diseases of Women, p. 679: London, 1878. *Campbell, H. F.*—Pneumatic Self-replacement of the Gravid and non-Gravid Uterus: American Gynecological Transactions, Vol. I., 1876. *Croom, J. Halliday*—The Management of Anterior and Posterior Displacements of the Uterus: Brit. Med. Journ. 1888, I., p. 286. *Duncan, Matthews*—Diseases of Women, p. 403: London, 1886. *Emmet*—Principles and Practice of Gynæcology, pp. 278 and 312: Philadelphia, 1884. A Study of the Causes and Treatment of Uterine Displacement: Amer. Journ. Obstet. 1887, p. 1040. *Fritsch*—Die Lage-veränderungen der Gebärmutter: Billroth und Luecke's Handbuch, Stuttgart, 1885. *Hart*—The Structural Anatomy of the Female Pelvic Floor: Edinburgh, 1881. *Herman*—On the Relation of Anteflexion of the Uterus to Dysmenorrhœa: Lond. Obst. Tr., Vol. XXIII., p. 209. Pathological Importance of Flexions; Lancet, 1884, II., pp. 672, 729, 771. *Hewitt Graily*—The Mechanical System of Uterine Pathology: London, 1878. Importance of Flexions and Displacements: Lancet, 1884, I., pp. 1020, 1063, 1110; and Lancet, 1885, I., pp. 243, 284. The Early History and Etiology of Flexions of the Uterus: Brit. Med. Journ., 1886, II., p. 913. *Mundé*—The Curability of Uterine Displacements: Amer. Jour. of Obst., Oct. 1881. *Ruge*—Congenitale Retroflexio: Zeitschrift für Geburtshülfe und Gynäkologie, 1878, Band II., S. 24. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane, S. 140: Leipzig, 1879. *Schultze, B. S.*—Ueber Versionen u. Flexionen u.s.w.: Archiv f. Gyn., Bd. IV., S. 373. Zur Frage von der patholog. Anteflexion der Gebärmutter: ibid., Bd. IX., S. 453. The Pathology and Treatment of Displacements of the Uterus—English Translation by J. J. Macan: London, 1888. *Simpson, Sir J. Y.*—Diseases of Women, pp. 253, 245, and 764, Edin. 1872. *Thomas*—Diseases of Women, pp. 363, 408: London, 1880. *Van De Warker*—The relation of symptoms to Versions and Flexions of the Uterus: Amer. Gyn. Trans., 1879, p. 334. *Vedeler*—Ueber Dysmenorrhoe: Archiv für Gyn., XXI. 211. *Wylie*—Prevention and Treatment of Anteflexion and Anteversion: Amer. Jour. Obstet., 1884, p. 1261; and Edin. Med. Jour., XXX., 1148. See also Index of Recent Gynecological Literature in the Appendix. Macan's translation of Schultze's work on Displacements has brought his comprehensive study of the subject within reach of English readers; it contains a good bibliography up to 1880.

Preliminaries.

As the uterus is a movable organ within the pelvis, it is subject to various changes of *position;* as it is composed of muscular tissue, it is liable to alterations of its normal *curvature.* Both of these changes are described in English text-books as "displacements," although, strictly speaking, this term should be applied only to the former.

The normal form, position, and relations of the uterus have been already described (see Chap. II.).

The uterus is constantly exposed to forces producing a temporary displacement. In front there is the *bladder*, the dilatation of which displaces the uterus backwards and somewhat upwards (fig. 42). Behind there is the *rectum*, which normally should have little influence on the position of the uterus; but, owing to inattention to its regular evacuation, it is frequently over-distended and thus acts as a displacing cause operating from above and behind. Above there is the *abdominal pressure*, which is constantly acting on the uterus especially during inspiration. One has only to watch the movements of the anterior vaginal wall during respiration to see that this factor is always operating. Its action is of course increased by whatever increases the intra-abdominal pressure, that is, by any straining efforts which bring the abdominal muscles into play.[1] Below there is the *pelvic floor*, which has a constant action in supporting the uterus against the abdominal pressure.

The most important recent contribution on the normal position of the uterus and displacements produced pathologically is from Ziegenspeck. He examined the condition of the pelvis *post-mortem* in 56 cases, in 35 of which he had previously noted the condition during life according to Schultze's method. After describing the most important *post-mortem* changes, he mentions that he found the uterus anteflexed *post-mortem* in 24 out of the 56. His conclusions as to normal attachment of the uterus is thus summed up. The pelvic floor almost altogether supports and holds the anteflexed normally fixed uterus; the elastic traction of the vessels of the pelvic organs and of the peritoneum keep it in this anteflexed position. The uterus in this position is to a certain extent incorporated with the pelvic peritoneum, its attachment to the neighbouring organs being only of secondary importance. As to the pathological processes, he concludes that changes in the walls are only the result, never the cause of displacement. The fixation of the uterus was always more marked in cases of retroflexion than in those of pathological anteflexion. Peritonitic changes have little influence on the position of the uterus, while parametric ones are very important, being present in all cases of anterior and of posterior displacement: in anterior, affecting the utero-sacral ligaments; in posterior, the cellular tissue round the spermatic vessels and beside the bladder and anterior fornix of the vagina.

Physiological and Pathological Displacements.

We must distinguish between *physiological* and *pathological* displacements. The former is transient, and passes away when the cause has ceased to operate; the latter is persistent, and produces permanent alterations in form, position, and structure. It is difficult to draw the line between those two. The pathological condition is frequently due to simple overstepping of the limits of the physiological. Thus the carrying of the uterus backwards into a retroverted position by the distention of the bladder is physiological, while its remaining permanently in that position is pathological.

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[1] Tight-lacing will intensify this action of the abdominal muscles. Braxton Hicks believes that a concave disposition of the abdominal muscles, found in spare women, prevents the bladder from expanding upwards and forwards and makes it either unduly antevert the uterus (if it be already pathologically anteverted) or retrovert it:—Lancet, 1886, I., p. 537.

[2] Ueber normale und pathologische Anheftungen der Gebärmutter und ihre Beziehungen zu deren wichtigsten Lageveränderungen: Archiv f. Gyn., Bd. XXXI. S. 1.

It is evident that the uterus can be displaced in at least three ways: *first*, the different parts of it may alter their position relative to one another; *second*, it may rotate round the transverse axis; *third*, the organ may be displaced as a whole. Any great rotation round the vertical axis is prevented by the attachments of the uterus.

Definitions. 1. Alteration in the relative position of body and cervix constitutes *flexion* of the uterus, in which there is a change in the curvature of the long axis, *i.e.*, in the direction of the uterine canal.

2. Rotation of the organ round an imaginary transverse axis constitutes *version* of the uterus.

3. Displacement of the organ as a whole, although frequently observed, has not been described in English works by a precise term. We might use the term *position* with the suitable prefix. Thus when the uterus lies "back as a whole" in the pelvis, it might be described as "a retroposition" or as "retroposed" (*Germ.*, retroponirt).

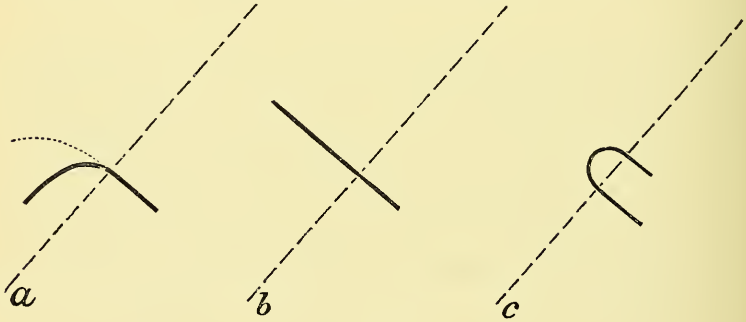

FIG. 200.

DIAGRAMMATIC SCHEME OF FLEXIONS. The broken line represents plane of brim; the dark line, the axis of uterus; the dotted line in *a*, its normal curvature. For letters see text.

The uterus, in its normal condition, is anteflexed, anteverted, anteposed—placed as far forward as the bladder will allow.

Various deviations from the normal condition may occur.

(*a*.) There are three possible changes in *flexion*. To understand these, suppose the direction of the cervix to be fixed. The uterine axis may be (pathologically) *ante*flexed (fig. 200 *a*), so that the normal curvature is increased; this is sometimes associated with retroposition. The axis may become *straight*, as occurs in so-called anteversion (fig. 200 *b*). It may also be *retro*flexed (fig. 200 *c*); this condition occurs rarely by itself, but associated with retroversion it is a common displacement.

(*b*.) *Version* round a transverse axis is either forwards or backwards. An increase of the normal *ante*version (fig. 201 *a*) is problematical; the condition generally so described is more often the result of straightening of the uterine axis (fig. 200 *b*). *Retro*version occurs as seen at fig. 201 *b*, and is further always present where there is retroflexion (fig. 201 *c*).

The body of the uterus may also be drawn to either side of the pelvis, the cervix being directed to the opposite side. This constitutes *lateri-version.* Normally, the uterus is slightly lateri-verted to the right.

(*c.*) Change in *position*, or displacement of the organ as a whole, is upwards, downwards, backwards, or to either side. *Upward* displacement occurs in pregnancy or whenever there is a tumour present which lifts the uterus out of the pelvis; it is of little pathological significance. *Downward* displacement occurs in prolapsus uteri, and will be discussed under that head (Section VII. Affections of the Pelvic Floor). A change in position *backwards* or to *either side* is produced by pressure or by traction; when produced by cicatricial contraction, these are the most important conditions we have to deal with.

We have considered from a theoretical point of view the variations in flexion and version in detail, to enable the student to understand clearly what these terms mean. Too much importance should not be attached to slight variations; the student need only note the following points.

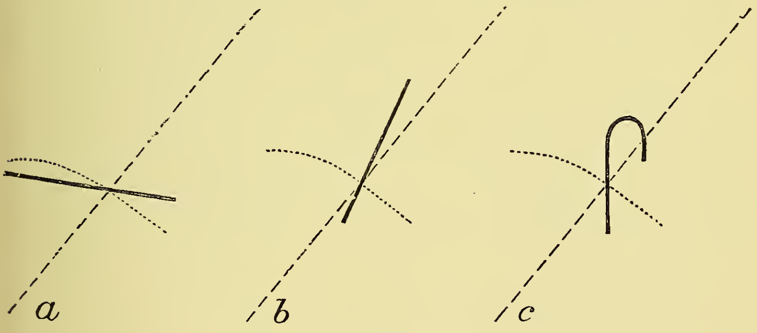

Fig. 201.
Diagrammatic Scheme of Versions.

1. The normal curvature may be exaggerated—anteflexion.
2. The uterus may be straightened, the normal angle becoming less pronounced and thus throwing the cervix more backwards—anteversion.
3. The uterus may be directed backwards—retroversion.
4. It may not only be turned backwards but the normal angle may be reversed, the fundus being bent backwards instead of forwards—retroversion + retroflexion.
5. The uterus may be displaced as a whole, usually by cicatricial contraction. This last condition is the most difficult to treat.

The *etiology* of flexions and versions is a subject of great importance. Etiology. In a certain number of cases they are congenital, a fact to be borne specially in mind with regard to retroversion. In many cases they result from inflammatory conditions,[1] pelvic peritonitis, and especially cellulitis (*v.* p. 173). We should therefore inquire carefully into the origin and duration of the symptoms, and on making a physical examination not be content with ascertaining merely that there is a displacement but find out if possible the cause. This will guide both in prognosis and treatment; it will indicate what cases we may hope to cure, and what cases we should leave alone. A knowledge of etiology enables us to prevent the occurrence of displacements, as, for example, of retroversion in the puerperal condition.

Frequency.

Of the *frequency* of forward displacements we have no data, as there is no agreement as to what is to be considered a pathological degree of ante-flexion or -version. As to backward displacements, Fränkel found them in 18 p.c. of gynecological cases.[2]

Symptoms.

The *symptoms* of these displacements have given rise to much discussion, some maintaining that they produce no symptoms at all. We sometimes, on examining a patient, find a retroflexion which has not made its presence felt by any symptoms. This is however the exception; as a rule, backward displacements are followed by a train of symptoms. *This apparent contradiction is to be explained by the fact that flexions and versions, in themselves, give rise to no symptoms primarily.* The symptoms arise *secondarily:* they are due (1) to interference with the functions of menstruation, conception, and pregnancy; (2) to chronic metritis and endometritis which is produced by the displacement; (3) to pelvic cellulitis and peritonitis, which frequently accompany the displacement and are often the cause of it. Bantock, in his interesting monograph on the Use and Abuse of Pessaries, gives very fully the various views held as to the significance of displacements as well as the results of his own experience.

Physical Examination.

As regards the *physical examination*, it is evident that the position and direction of the cervix is no guide to the position of the fundus. If we had simply to do with versions, we might compare the uterus to a lever of which the body would be the long and the cervix the short arm; and the direction of the short would indicate the position of the long arm. But the possibility of flexion introduces a joint on the lever, so that the direction of the short is no guide to the direction of the long arm. We cannot from a simple vaginal examination of the cervix infer the position of the fundus, which is the point to be ascertained. A careful bimanual examination, supplemented if necessary by the use of the sound, is essential for a diagnosis.

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[1] Ziegenspeck's researches confirm this from pathological anatomy, and Emmet (*loc. cit.*) has recently from a clinical standpoint emphasised the importance of pelvic inflammation as causing versions of the uterus, and would limit the use of pessaries (invaluable in suitable cases) accordingly.

[2] In 936 of 5180 cases in public and private practice from 1882-85. He found retroflexion commoner than retroversion, as 645 to 291. Ueber die Erfolge der mechanischen Behandlung, u. s. w.: Archiv f. Gyn., Bd. XXIX., S. 316.

As regards *treatment* the student should recognise how many lesions are present, and whether they are causes or results; a frequent chain is that a cellulitis produces a displacement which is followed by metritis, endometritis, and ovaritis. In most cases there is more than one pathological condition present, and these must be treated in order. We first *check existing inflammation* by hot-water injections, blistering, rest, and the use of the glycerine plug.[1] Ergot is given when menstruation is increased. When the absence of tenderness on examination has shown that inflammation is checked, we then—but not till then—think of treating the displacement. The time chosen should be between two menstrual periods. In backward displacement, we bring the uterus to its normal position and retain it there. In some cases of anteflexion we dilate or straighten the uterine canal. The *after-treatment requires more attention than the immediate correction of the displacement*, and months of careful watching are necessary. Thus, the keeping of the uterus in its place by a carefully adapted pessary is more important than the replacment; the keeping of the uterine canal open after Sims' operation is more important than the operation itself.

Treatment.

Halliday Croom in a paper read recently in the Obstetric Section of the British Medical Association emphasises the distinction between displacements in virgins or nulliparæ and those in parous women in regard to treatment, the former almost never calling for reposition and the use of pessaries. The discussion on his paper gives the most recent expression of opinion as to the importance and treatment of displacements.

ANTEFLEXION.

PATHOLOGY.

Anteflexion, as has before been stated, is merely an exaggeration of the normal condition. As to its frequency, there is great difference of opinion. The reason of this diversity is that a degree of flexion which would be called pathological by one observer would still be called physiological by another. The question of symptoms does not help us in deciding this; because, on the one hand, we sometimes find an extreme degree of flexion although the patient does not complain of any special symptoms; on the other hand, symptoms often described as characteristic are due to a different cause. It is in fact worthy of consideration whether we should not limit the term anteflexion, as descriptive of a special lesion, to cases of pathological anteflexion resulting from inflammatory conditions of the cellular tissue. Anteflexion is more frequent in nulliparæ, while retroflexion is more common in multiparæ.

The usual *seat of the flexion* is at the upper portion of the cervix, or at its junction with the body. Flexion of the body itself is rare. Sometimes the cervix is bent sharply forwards, so that it lies in the axis of the vagina and forms a distinct right angle with the body which is approximately in its normal position (see fig. 202). In other cases, the uterus is sharply curved on itself (see figs. 38 and 203). This last condition is sometimes mistaken for retroversion, because the finger feels through the posterior fornix the supra-vaginal portion curving backwards and the position of the fundus is not ascertained till the bimanual examination is made. In such cases the examination with one finger in the rectum is useful, as we can thus get above the point of flexion and feel that the fundus turns forwards.

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[1] Electricity has been used to diminish the size of the displaced uterus and restore the tone of its supports.—*See* Appendix.

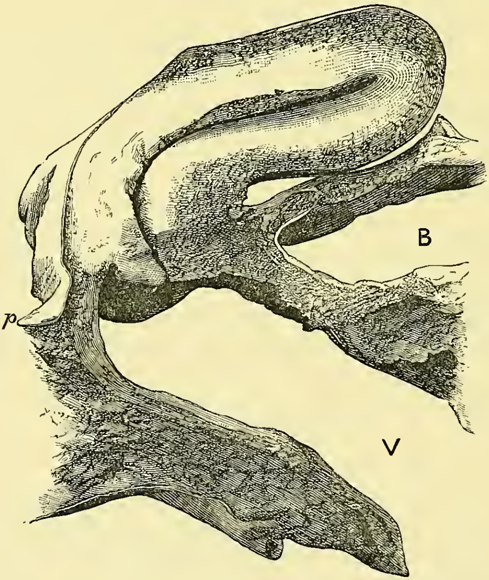

FIG. 202.
ANTEFLEXION WITH STENOSIS AT OS EXTERNUM. *V* vagina, *B* bladder, *p* peritoneum of pouch of Douglas (*Winckel*).

The vaginal portion is frequently small and the os reduced to a pin hole (congenital cases); sometimes it is high up and difficult to reach, being drawn upwards and backwards by cicatricial bands. As regards the microscopic changes in the tissue, we are still in want of information. Virchow found no fatty degeneration of muscular fibre at the angle of flexion; the tissue was anæmic at this point but congested elsewhere. According to Rokitansky, the connective tissue framework of the uterus is thinnest at the os internum; hence the liability to flexion at this point.

ETIOLOGY.

Etiologically we distinguish two kinds of anteflexion, the congenital and the acquired.

Congenital Anteflexion.

In cases in which the anteflexion is *congenital*, the whole uterus is imperfectly developed, the cervix is small and the pin-hole os looks downwards and forwards. Fritsch gives an ingenious explanation of how the flexion is produced in such cases. The uterus of the new-born child has thin walls and is flexible: the intra-abdominal pressure acts on

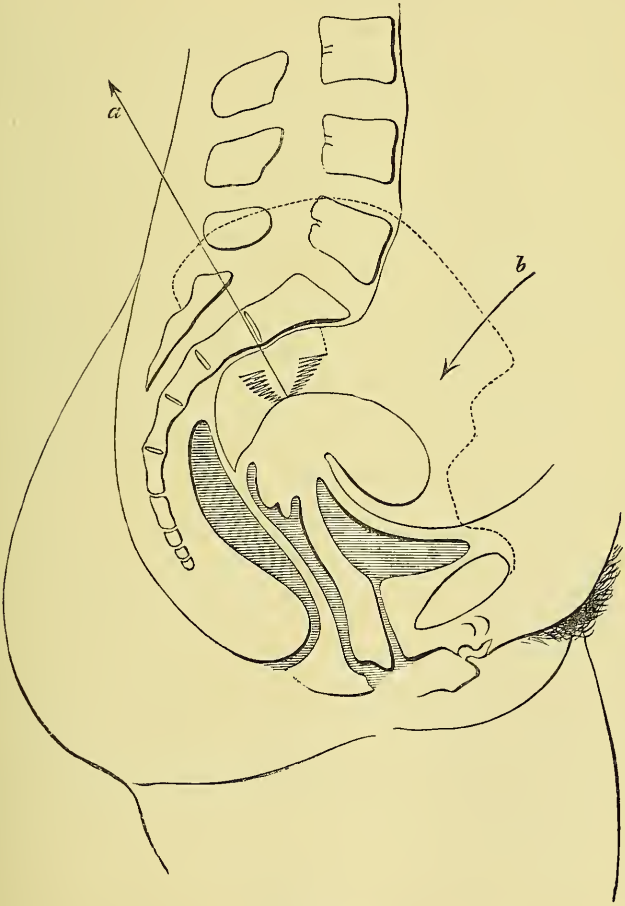

Fig. 203.

Diagram to show Anteflexion produced by Cicatrisation of Utero-sacral Ligaments. The arrows indicate the direction of the forces modifying the position and curvature of the uterus; the dotted line the outline of the ilium. (*Schultze*) the posterior surface of the fundus and produces anteflexion; this action is counteracted by the bladder on which the uterus is, as it were, moulded; when the uterus remains small and thin-walled, it does not offer such a large surface to the bladder so as to be raised by it and have its flexion undone. Accordingly, a pathological degree of anteflexion is produced. The same writer would also refer some cases to congenital shortening of the utero-sacral ligaments.

Acquired Anteflexion.

As regards *acquired* anteflexion, it is undoubtedly often the result of inflammatory changes behind the uterus. In many cases of anteflexion, we observe that the cervix is higher than its normal position and far back in the pelvis; and that the attempt to bring it to its normal position produces pain. The cause of this condition was first brought into notice by Schultze,[1] who ascribes it to a cellulitis in the utero-sacral ligaments; this produces cicatricial contraction so that the cervix is drawn upwards and backwards, and the fundus thrown more forwards. Bandl thinks the first step in the process is a cervical catarrh; and that the inflammation spreads from the mucous membrane to the tissue of the cervix itself, making it more rigid, and thence to the cellular tissue round the cervix. Schroeder, however, holds that the retraction of the cervix is produced by adhesions resulting from peritonitis. We draw attention specially to this cause of anteflexion, because it can be distinctly made out by careful examination. When it has been made out it is a contra-indication to hasty operative interference, and the prognosis as to cure is unfavourable.

Hewitt's Views.

Graily Hewitt refers this, as all other flexions, to softness of the uterine tissue and thinness of wall, producing undue flexibility.

It is alleged that a fibroma, or other tumour increasing the weight of the fundus, will favour anteflexion if the fundus be directed forwards. In the commencing enlargement of pregnancy, the fundus droops more forwards or is at least more distinctly felt through the anterior fornix.

Unequal growth of the uterine walls has been given as the cause of congenital flexions, and unequal involution of the walls as the cause of flexions acquired during the puerperium. This is merely an explanation of how it is produced; the cause of this unequal growth requires, in turn, an explanation.

SYMPTOMS.

The most important symptoms of pathological anteflexion are—

Dysmenorrhœa,
Sterility.

In addition to these there are sometimes present—

Leucorrhœa,
Menorrhagia.

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[1] Loc. cit. S. 414.

It will be noted that these are the symptoms of pelvic and uterine inflammation and are not pathognomic.

In many cases we find a well-marked anteflexion giving rise to no symptoms which patients complain of, as they are not accustomed to speak of sterility as a symptom.

Dysmenorrhœa. By this we understand that menstruation is accompanied with pain. The form of dysmenorrhœa present in anteflexion has been called "uterine," in contradistinction to "ovarian" (see Dysmenorrhœa, Section VIII.) By "uterine dysmenorrhœa," is meant that the pain is not marked until the menstrual flow has appeared and that it continues as long as the discharge continues. The pain is felt in the small of the back and sometimes in the pelvis generally, but is not localised in one ovarian region.

Two different explanations of this pain have been given. For convenience we describe these as the obstruction and the congestion theories.

Mechanical Theory of Dysmenorrhœa.

1. The *obstruction* or *mechanical theory.* According to this, the flexion of the uterus produces a narrowing of the uterine canal at the point of flexion.[1] Hence, when the menstrual decidua and blood are shed, they find an obstacle to their free exit. There is consequent retention and coagulation, and the coagula stimulate the uterus to muscular contractions to effect their expulsion. The mechanical resistance to the outflow of blood and the uterine contractions excited to overcome this, are the cause of the pain. The condition is like that in stricture of the male urethra. The blood, like the urine, collects but cannot be passed without pain; there is dilatation with sometimes secondary hypertrophy of the uterus in the former case, as of the bladder in the latter. It may fairly be objected to this mechanical explanation that the discharge is not always clotted, that in some cases it is very small in quantity, that it is doubtful whether the blood coagulates in the uterus, and that in many cases the pains complained of have not the distinctive character of labour pains. What has been already said with regard to Dysmenorrhœa ascribed to Stenosis of the Os externum (*v.* p. 267) holds good also here.

Congestion Theory.

2. The *congestion theory* is clearly stated and advocated by Fritsch.[2] According to this gynecologist, the dysmenorrhœa is not due directly to the bend on the canal. The pain arises from the resistance which the muscular tissue of the uterus offers to the hyperæmia. In normal cases, this tissue yields to the distending vessels; but when the uterus is small or bent on itself, there is an obstruction offered to the flow of blood. The mucous membrane cannot swell up as it does normally. Thus there

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[1] It is doubtful whether this occurs. Graily Hewitt (Brit. Med. Journ. 1888, I., 461) figures a specimen where the lumen of the tube is flattened out laterally at the angle of flexion.

[2] Loc. cit. S. 35.

is undue vascular tension and compression of the nerve endings in the uterus. This last causes the pain.

Whether this explanation harmonises better with the facts it is difficult to say; but we should suggest a modification of Fritsch's view. The flushing of any diseased tissue with blood causes an aggravation of pain, which is increased if the tissue be of a dense structure. The intense pain in periostitis as the affected limb becomes warm in bed, is thus accounted for. Now the tissues of the uterus are frequently in a state of chronic inflammation, and there is sometimes increase of connective tissue making it of less yielding structure; this occurs in retroflexion complicated with subinvolution. The monthly flushing of the pelvis with blood would, under these circumstances, be accompanied with pain. We must also remember that cellulitis and peritonitis are often present with anteflexion; and increase of pelvic congestion will, of course, produce increase of pain.

Anteflexion and Dysmenorrhœa.

Herman and Vedeler have shown that the connection between Anteflexion and Dysmenorrhœa has been over-estimated. In his very interesting paper on the cause of Dysmenorrhœa, Vedeler reports on a large number of cases (observed by himself) of patients with and without Dysmenorrhœa. To ascertain the relation of this symptom to anteflexion we extract from his tables all the cases of nulliparæ with uterus to the front: we take nulliparous cases only, because parity in itself affects anteflexion; and consider cases with uteri to the front, as we are dealing with *ante*-flexion only. We find that 37·3 p.c. (25 out of 67) of patients with Dysmenorrhœa had a well-marked anteflexion, and that 33·3 p.c. (46 out of 138) of patients without Dysmenorrhœa also had well-marked anteflexion. The first fact by itself would lead us to suppose that anteflexion was frequently a cause of Dysmenorrhœa, but, taking it along with the second, all that we can say is that anteflexion is rather more common in cases of Dysmenorrhœa than otherwise. Unfortunately, Vedeler does not distinguish between anteflexion *per se* and that secondary to inflammatory changes behind the uterus.

Sterility.

Sterility is frequently associated with anteflexion; the patient is not so likely to refer to it, as the dysmenorrhœa is the more pressing symptom and that for which she seeks advice. This symptom has been referred to the obstruction in the uterine canal; as the menstrual blood is prevented from passing downwards, so the spermatozoa are prevented from passing upwards (*v.* also p. 268). But it is evident that this mechanical explanation is insufficient, because no mere contraction could prevent the passage of microscopic spermatozoa; without doubt sterility is frequently the result of the binding down of the ovaries or the Fallopian tubes by concomitant inflammation. However we explain it, the clinical fact remains that by passing the sound or dividing the cervix we place the patient under more favourable conditions for conception.

Dyspareunia—pain on sexual intercourse—is occasionally an important symptom, though naturally the patient does not refer to it. In such cases we generally find that there is inflammatory action behind the cervix.

Leucorrhœa is generally present, more especially if the uterus be enlarged. It is not so important a symptom as it is in retroflexion.

Menorrhagia is sometimes present, when there is uterine enlargement or endometritis as the result of anteflexion.

PHYSICAL DIAGNOSIS.

On making the vaginal examination the cervix is felt to be high up, and lies in the axis of the vagina with the os looking downwards and forwards. It may be small and conical with a pin-hole os (congenital, *v.* fig. 155); or the anterior lip may be elongated, the end of the cervix being at the same time somewhat flattened against the posterior vaginal wall. The body of the uterus is felt in the anterior fornix continuous with the cervix, with which it forms a distinct angle in which the tip of the finger may be placed. If the flexion be high up or the uterus drawn upwards, the body may not be felt on simple vaginal examination. Even if it be felt, we cannot be certain that it is the body of the uterus till the Bimanual is made as follows. Endeavour to get the body felt in the anterior fornix fairly between the hands; by examining all round, make sure that what is grasped is the body of the uterus. Now place the index finger under the fundus in front of the angle and the middle finger against the cervix; and, making pressure with the external hand, ascertain to what extent the flexion yields. Examine carefully the posterior fornix to see if there are any bands drawing the cervix backwards, try whether bringing the cervix forcibly forwards causes pain, which would indicate an inflammatory condition in the utero-sacral ligaments or the presence of adhesions in the pouch of Douglas. We can ascertain this even better by passing the middle finger into the rectum, and at the same time making the bimanual examination with the index finger in the vagina. The finger in the rectum feels a pouch in the anterior rectal wall bounded by a tense band on each side (utero-sacral ligaments), or one or more cord-like adhesions (the result of former peritonitis), or a general resistance to pressure which produces pain. Any of these conditions indicates that the cause has been inflammation which has produced cicatrisation behind the cervix.

Though the bimanual examination is in many cases sufficient, it may be supplemented by the use of the sound. This is necessary for differential diagnosis, and its frequent introduction constitutes one form of treatment. Curve the sound to correspond to the angle of flexion. It will be found to pass with comparative ease for about an inch or an inch and a half, and then it is stopped by the angle of flexion. To get it past this, press up the fundus through the anterior fornix with the finger in the vagina or draw down the uterus with the volsella. The sound shows that the length of the uterine cavity is sometimes diminished (congenitally small uterus), sometimes increased (the result of the obstruction to the out-flow of menstrual blood). It may further show tenderness in the uterine cavity (endometritis). The use of the sound is undesirable where there is inflammation behind the uterus; and, when the Bimanual places the diagnosis beyond doubt, it is unnecessary except for treatment.

DIFFERENTIAL DIAGNOSIS.

Differential Diagnosis of Anteflexion.

The only conditions which, after this careful examination, might yet be mistaken for an anteflexion are—

Myoma in the anterior uterine wall,

Cellulitis between the cervix and the bladder—a very rare condition.

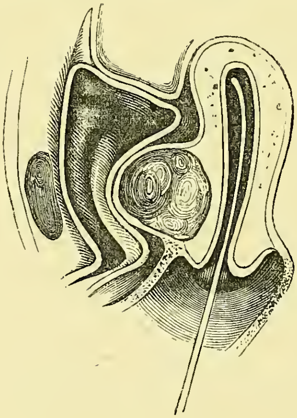

Fig. 204.

Sound passed to show that a Myoma of the Anterior Wall is not an Anteflexion (*Leblond*).

Diagnosis from Myoma,

A *myoma* is easily diagnosed by the sound. As in anteflexion, a body is felt in the anterior fornix; and we must ascertain whether this body is the fundus uteri. When the sound is passed into the uterus (fig. 204) in a case of myoma, a finger in the anterior fornix does not feel the sound or feels that a body lies between it and the instrument. Now make the bimanual examination with the sound in the uterus; the position of the fundus is indicated by the external hand's feeling the point of the sound.

From Cellulitis.

The diagnosis from *cellulitis* is less easy, because through the tenderness it is difficult to ascertain whether the body felt in the anterior fornix is the fundus uteri or a cellulitic deposit. A careful bimanual examination will, if it be a cellulitic deposit, show that the fundus uteri is lying in some other position. When active inflammation is present, the use of the sound is contra-indicated.

PROGNOSIS.

The prognosis should always be guarded in respect of the disappearance of symptoms. The unfavourable cases are those in nulliparæ, due to utero-sacral cellulitis.

TREATMENT.

Pelvic inflammation, if present, must first be treated. Where the uterus is displaced by cicatricial bands, the stretching of these by massage has been suggested and is worthy of trial.

Treatment by Sound.

In cases uncomplicated by pelvic inflammation and where there is dysmenorrhœa, the occasional *introduction of the sound*, say twice-a-week between the menstrual periods, is sometimes followed by distinct relief of the symptoms. It has the advantage of being easily done, is seldom followed by injurious effects if done with ordinary care, and should always be tried in the first instance. The passage of bougies is also useful; it has already been referred to under the treatment of rigid cervix (*v.* p. 266).

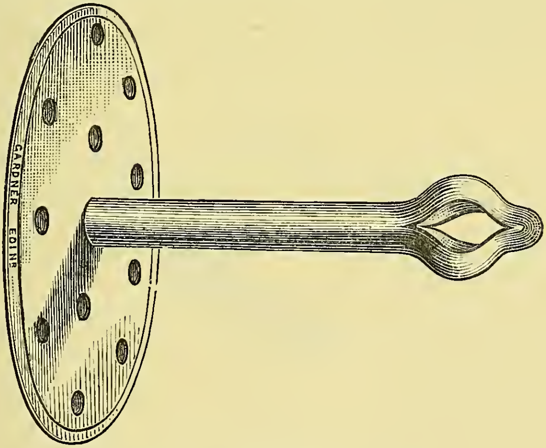

Fig. 205.
Greenhalgh's Intra-uterine Stem.

Treatment by Stems.

Intra-uterine stem pessaries have also been recommended. We have already described the galvanic stem and its mode of introduction at p. 277. Fig. 205 shows Greenhalgh's gutta-percha stem which is carried in on the ordinary uterine sound. Thomas[1] has recently recommended glass stems supported in a Hodge pessary with a cup. All stem pessaries must be used with great caution.

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[1] The Etiology, Pathology, and Treatment of Anteflexions of the Uterus: Am. Journ. of Obstet., 1888, p. 1042.

Treatment by Division of Cervix.

Division of the cervix may also be performed. It is only indicated where there is much cervical catarrh. The best mode of performing it is by the bilateral operation of Sir J. Y. Simpson, described at p. 271. Marion Sims introduced the antero-posterior division represented in fig. 206. The posterior lip of the cervix is divided to the fornix and the projecting angle of the anterior wall incised by a tenotomy knife passed into the cervical canal. This operation was based on the mechanical theory of Dysmenorrhœa (*v.* pp. 267, 351), and stands or falls with that theory; its object is to make a new straight canal.

The treatment of anteflexion by specially adapted vaginal pessaries is recommended by Thomas and others, but it is not a scientific one. It is wrong in principle, because the fundus uteri cannot be propped up by an arm of the pessary projecting through the anterior fornix so as to diminish the angle of flexion. In some cases where the uterus is large and heavy we find that benefit is derived from supporting the uterus as a whole. But this is best effected by an ordinary vaginal pessary (Hodge or Albert Smith), and is not a mode of treatment of anteflexion specially. We shall refer to this again under the treatment of anteversion.

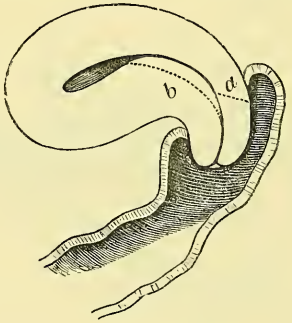

Fig. 206.

Sims' Division of Cervix; *a* incision in posterior lip, *b* incision at knee of flexion (*Marion Sims*).

ANTEVERSION.

PATHOLOGY AND ETIOLOGY.

The *pathological change* consists in a straightening of the uterine axis, so that the normal angle of forward curvature is diminished and the cervix passes more directly backwards. The uterus is usually enlarged and its texture is firmer. In this condition it is movable or fixed. If the former, its position varies with the distention of the bladder; if the latter, the fixed uterus will press more or less on the bladder as it distends and thus produce one of the symptoms of anteversion.

According to Fritsch, the fixation of the uterus is never to the pubes; this is because the bladder, lying between the fundus and the symphysis, prevents adhesions from forming. On post-mortem examination of a case in which he had diagnosed anteversion with fixation, he found that the fundus was bound down at its left angle.

ETIOLOGY.

Significance of Anteversion.

As anteversion is *the form and position taken up by the uterus when it is enlarged through chronic metritis*, the *causes* which produce anteversion are those which produce chronic metritis—subinvolution, laceration of the cervix, and other causes of pelvic inflammation (*v.* Chronic Metritis).

This position also occurs physiologically in early pregnancy; probably because the increased weight of the uterus causes it to fall more forwards.

SYMPTOMS.

There are no symptoms characteristic of anteversion *per se;* but we generally find present, in the first place, the local symptoms of chronic uterine and pelvic inflammation.

Thomas draws attention specially to loss of power in walking—when the version was treated, power was restored; this was probably a reflex phenomenon. Sometimes there are symptoms due to interference with the functions of the bladder and the rectum. Pressure of the fundus (when the uterus is *fixed*) on the bladder produces frequent calls to micturition; pressure of the cervix on the posterior wall of the vagina is said to produce erosion and catarrh, and on the anterior wall of the rectum to cause painful defæcation. These last two are very doubtful.

Further, we may have the train of general symptoms which follow any long-standing disturbance of the reproductive system, viz., derangements of the digestive and nervous systems. Schroeder draws attention to the fact that discomfort is often produced when the uterus is enlarged but freely movable, and that this is due to the heavy organ's becoming displaced on the movements of the patient; further, that it is relieved if the uterus is fixed by a vaginal ring pessary.

DIAGNOSIS.

There is usually no difficulty in diagnosis. The finger in the vagina feels the cervix passing directly backwards, the os looking towards the hollow of the sacrum. The body of the uterus is distinctly felt through the anterior fornix; and on tracing it back to its junction with the cervix, we do not feel the normal forward curvature. The whole organ is usually enlarged and firm in texture. From the distinctness with which the uterus is felt when the bladder is empty, we might infer that only the anterior vaginal wall lay between it and the finger. But, if we make the examination when the bladder is partially distended or pass the sound into the empty bladder, we find that that organ passes backwards almost as far as the cervix uteri. Perhaps the bladder symptoms (which are present in marked cases) might be explained through the traction thus made on its walls and its abnormal position, these interfering with its dilatation.

Bladder Symptoms in Anteversion.

The bimanual examination shows that the body felt in the anterior fornix is the fundus uteri. The student should not however be content with this knowledge, but should examine carefully the size and mobility of the uterus; and, when it is fixed, should ascertain the cause of this.

The introduction of the sound is difficult on account of the high position of the os, and its use is unnecessary except in cases of doubt as to whether the body felt anteriorly is the fundus uteri.

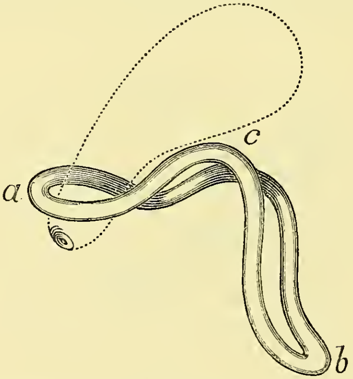

Fig. 207.

Graily Hewitt's Cradle Pessary. *a* is in posterior fornix; *b* at vaginal orifice; *c* in anterior fornix (*Barnes*).

The only case in which there is difficulty in differential diagnosis is when there has been inflammatory deposit in front of and around the cervix, simulating the anteverted fundus. In these cases the combined examination is difficult from existing inflammation. The examination with one finger in the rectum enables us, in such cases, to ascertain that the fundus uteri is at least not lying to the back.

TREATMENT.

From what we have said in regard to the symptoms, it follows that the treatment, in the first instance, is that of endometritis, metritis, cellulitis, or peritonitis, according to the condition which is present.

As regards the supporting of the uterus, great benefit may be derived from the glycerine plug, which in this case should be well packed into the posterior fornix. The simple vaginal pessary (Hodge, Albert Smith, ring) is useful in supporting the uterus as a whole, and in fixing the cervix.

Anteversion Pessaries.

As already said under anteflexion, the fundus cannot be immediately supported through the anterior vaginal wall. Various forms of pessary have been devised, but none can be recommended. There is the "cradle pessary" of Graily Hewitt (fig. 207), made of vulcanite. Mundé strongly recommends an anteversion pessary by Gehrung. Thomas has devised several forms of anteversion pessary, of which one is represented at fig. 208. It is simply a Hodge pessary, with a projecting bar which passes into the anterior fornix and tilts the cervix forwards, and thus slightly retroverts the fundus. To facilitate its introduction the bar moves on a hinge so that it may be brought parallel with the pessary as it is passed in, while a concealed india-rubber spring brings it into place when it is within the vagina. The patient requires careful watching after its introduction, as it is liable to set up pelvic inflammation. Several cases are recorded by Thomas of benefit derived from wearing such a pessary.

Hewitt's.

Gehrung's.

Thomas'.

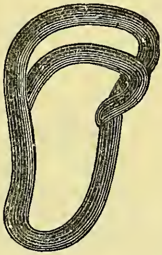

Fig. 208.
Thomas' Anteversion Pessary.

We have described anteversion as one of the displacements of the uterus. The student should note, however, that anteversion is in itself not a lesion but one of the "physical signs" of metritis, chronic pelvic peritonitis, or pregnancy. It is improbable that the mere anteversion of the uterus causes any distress. The ordinary statement that the uterus when anteverted presses on the bladder, is open to the fatal criticism that the uterus always presses on the bladder; while, so far as mere weight is concerned, there are, in the majority of cases, no special symptoms referable to the anteversion of early pregnancy. Any enthusiastic believer in anteversion pessaries is bound to insert them in all cases of early pregnancy. Anteversion is thus gradually ceasing to be considered among uterine displacements.

RETROVERSION.

PATHOLOGY AND ETIOLOGY.

Physiological Retroversion.

Physiological retroversion occurs whenever the bladder is fully distended (*v.* fig. 42). This is distinguished from the pathological condition by the fact that it is transient, and ceases when the bladder is emptied.

Pathological Retroversion.

Pathological retroversion is found under the following conditions.

1. It occurs congenitally—which we assume when we find on examining a virgin or nullipara the uterus retroverted and either no symptoms or a history of symptoms going back to puberty. This is by no means a rare condition in virgins, as Küstner found this in 21°/$_0$ of private and 13°/$_0$ of hospital cases of backward displacement; and Graily Hewitt in 23°/$_0$ of cases (60 out of 259) noted in his private practice during thirteen years.

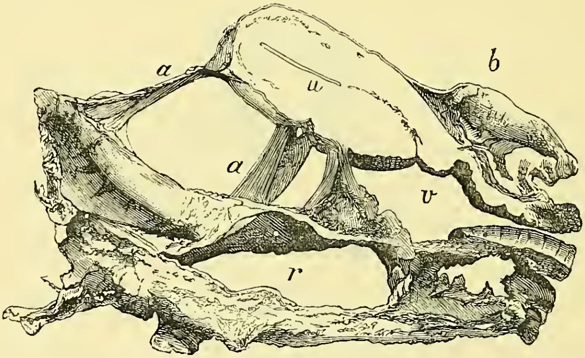

FIG 209.
UTERUS RETROVERTED AND BOUND BACK BY PERITONITIC ADHESIONS (*Winckel*). *aa* adhesions; *b* bladder; *v* vagina; *u* uterus; *r* rectum ($\frac{1}{2}$).

2. During the first days of the puerperium the uterus lies retroverted, or at least retroposed. The weight of the uterus and the laxity of its attachments make it occupy this position when the patient is recumbent.

3. It is produced by the mechanism of prolapsus uteri (*v.* Section VII.). The axis of the uterus changes its direction as the organ descends.

4. It is also of importance as a stage in the production of retroflexion—the most frequent and important displacement which calls for treatment. The uterus becomes retroverted, and then acquires a backward flexion.

5. Chronic peritonitis producing obliteration of the pouch of Douglas,

and cicatricial bands which drag the uterus backward, maintain, if they do not produce, retroversion—as is beautifully shown in the accompanying preparation from Winckel's Atlas (fig. 209).

The chief *causes* of retroversion are :—

1. A sudden straining effort, or a violent blow (a very difficult cause to establish) ;[1]
2. Non-return of the uterus to its normal form and position during the puerperium ;
3. Inflammatory action behind the uterus, producing adhesions in the pouch of Douglas ; or cicatrisation of the anterior vaginal wall.[2]

SYMPTOMS.

The symptoms of retroversion are the same as those found in retroflexion, to be presently described. When it arises during the puerperium, a late flooding—two to three weeks after labour—is sometimes a prominent symptom ; or there is a daily loss of blood in small quantities whenever the patient rises and goes about (*Fritsch*).

DIAGNOSIS.

On vaginal examination, the cervix is low down in the pelvis and the os looks downwards and forwards. The finger feels the supra-vaginal portion of the cervix through the posterior fornix and may be able to reach the fundus, but the posterior surface is straight—there is no angle.

Bimanual in Retroversion.

On bimanual examination, the hands can meet in the anterior fornix with nothing but the vaginal and abdominal walls between them. It is difficult to make out the body of the uterus. We may try to do this in two ways. *First*, with one finger in front of the cervix and the other behind it, lift the uterus upwards towards the abdominal walls ; the hand placed on the abdomen will feel the anterior surface of the body of the uterus moving under it. *Second*, tilt the cervix well forwards with the index finger in the vagina, and thus increase the retroversion ; the middle finger will feel the body of the uterus through the posterior fornix.

The rectal examination is of great service here. The sound will pass as in fig. 86.

The differential diagnosis is the same as in retroflexion. The only point requiring special notice here is that we may have a retroversion with an anteflexion high up. Cases of anteflexion due to cicatrisation of the utero-sacral ligaments are often, from the backward direction of the cervix, diagnosed as a retroversion (*v.* p. 350).

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[1] Graily Hewitt says that in 58 cases of backward displacement in virgins, nearly one-half (28 cases) traced their symptoms back to a severe fall, accident, or strain ; but this does not establish any of these as the cause.

[2] This acts by drawing the cervix forwards. Murdoch Cameron mentions a case where after division of a bridle on the anterior vaginal wall, the retroverted uterus became normal.—*Glas. Med. Journ.* 1887, p. 420.

TREATMENT.

This consists in (1) removing existing inflammation; (2) replacement of the uterus, when not fixed by adhesions; (3) retention of it in its normal position by pessaries: these will all be considered under retroflexion. Congenital cases should be left alone.

When adhesions are present, it is better not to interfere; or we may be content with supporting the retroverted uterus with a pessary.

RETROFLEXION.

For convenience this condition is usually called "Retroflexion," to distinguish it from "Retroversion" already described; strictly speaking, the condition is **RETROVERSION + RETROFLEXION.**

PATHOLOGY.

The pathological changes in the position and structure of the organs in the pelvis consequent on retroversion + retroflexion, can be learned only from sections made with the organs *in situ*. An exact knowledge of these changes is very desirable, as this displacement, with its accompanying complex train of symptoms, is one of the most important which come under the notice of the gynecologist.

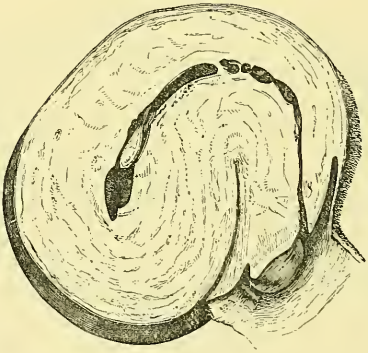

Fig. 210.
Extreme Retroflexion of Uterus (*Barnes*).

The following facts are based more on clinical examination than on pathological study. The changes in the various structures will be considered separately and shortly in a typical case of retroflexion in a multipara.

The *cervix* is directed downwards and forwards, or directly downwards (*v.* fig. 212). We observe clinically that it is much more easily reached. This is due partly to the alteration in its direction and position (being nearer the symphysis pubis it is more within reach), partly to the sinking down of the uterus as a whole in the pelvis. The os is patulous, because retroflexion usually implies previous parturition. If deeply fissured, it may form a gaping cleft which readily admits the tip of the finger. There is often ectropium and cervical catarrh. Sometimes there is marked hypertrophy of the posterior lip, so that it is mistaken for the projection of the whole vaginal portion.

The *uterus* is flexed on itself, so that the fundus lies in the pouch of Douglas, the depth to which the fundus descends and the acuteness of the angle of flexion varying in different cases (*v.* figs. 210 and 212). If the condition of the uterine walls offers no resistance to flexion, the intra-abdominal pressure will tend to drive the fundus downwards till equilibrium is maintained—that is, till the fundus rests in the bottom of the pouch of Douglas. In retroflexion, there is no counteracting force operating from below similar to that of the distending bladder in anteflexion.

Condition of the Uterus in Retroflexion.

The size of the uterus is increased, and its cavity measures more than two and a half inches. Since the flexion generally occurs while the uterus is still enlarged through subinvolution, it is difficult to say whether this hypertrophy arises as the direct result of the displacement or through its interfering with the process of involution. Whatever the cause of this hypertrophy is, its effect is to interfere with the natural cure of the displacement. The thickness of the uterine walls at the angle of flexion varies in different cases. Sometimes neither wall is atrophied at the point of flexion (fig. 210). Barnes says that according to his clinical experience this is the usual condition. On the other hand, Fritsch states that he has found marked thinning of the *posterior* wall at the angle of flexion. It is interesting to note that in a case of *congenital retroflexion* (see fig. 211) described by Ruge it is the *anterior wall* which is atrophied at the angle. The mucous membrane of the uterus is generally in a condition of chronic catarrh.

The microscopic changes consist in a dilated condition of the blood-vessels, with increase of connective tissue—the appearances produced by long-continued passive congestion. At the point of flexion, however, an opposite condition has been described; the blood-vessels were compressed and the tissues atrophied.

Ovaries in Retroflexion.

The *ovaries* follow as a rule the displaced fundus, the thin infundibulo-pelvic ligament stretching more readily than the ovarian. The position of the ovaries will, however, depend on the effects of peritonitic adhesions, which may fix them in any position. Sometimes we feel them below the fundus in the pouch of Douglas. They are frequently enlarged and tender on pressure.

Bladder in Retroflexion.

The *bladder* is not necessarily altered in position, but has no longer the uterus resting upon it. The utero-vesical pouch is obliterated in cases of well-marked retroflexion. The ureters are often compressed or bent, which leads to dilatation; frequently they are found dilated to the thickness of the finger. Fritsch observed in one case the left ureter obliterated by a mass of cicatricial tissue, and the corresponding kidney changed into a sac full of white atheromatous debris.

The *rectum* may have the retroflexed fundus pressing against its anterior wall.

The *peritoneum* is altered in its normal relations as follows. The broad ligaments have their surfaces reversed, that is to say, the anterior, which was formerly inferior, is now superior; from their attachments, they offer no obstacle to retroflexion. The utero-vesical pouch necessarily disappears. The pouch of Douglas must, on the other hand, be distended by the fundus uteri; this implies *stretching of the utero-sacral ligaments* associated with the alteration in position of the cervix.

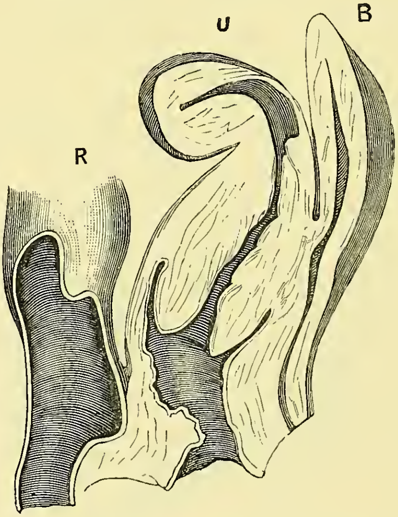

Fig. 211.
Congenital Retroflexion (*Ruge*). Note the thinning of the anterior wall of the uterus.

The *pelvic nerves* are occasionally affected, as shown by weakness in the lower limbs. This loss of power must be produced reflexly; from the anatomical relations, the retroflexed fundus cannot compress the motor nerves of the sacral plexus as is sometimes affirmed.

ETIOLOGY.

Retroflexion is, according to Fränkel's recent statistics, more common than retroversion.[1] As a *congenital* condition, it is not nearly so frequent as anteflexion. It is more common in multiparæ than in nulliparæ, because the etiology is specially related to the *puerperal condition.* In this condition the uterus is enlarged and heavy and its walls are soft. The ligaments are lax, and the tissues of the pelvic floor have been recently stretched and have not recovered their tone. Through the distention of the bladder, the uterus is often thrown into a retroverted position.

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[1] In 1882-85 he treated 936 retrodeviations of uterus of which 645 were retroflexions and 291 retroversions.

We sometimes find on examining a patient shortly after her confinement that the uterus is lying back in the pelvis even though the bladder be not distended; we may thus suppose that the *intra-abdominal pressure* (which, when the uterus is in its normal position, is directed upon its posterior surface) comes now to act on the anterior surface and drives the fundus backwards and downwards. If the uterine tissue is soft enough to allow the fundus to be fixed on the cervix, such a flexion will gradually take place when the patient makes straining efforts. Apart from this, the *dorsal posture* and the common practice of *tight bandaging* after confinement will favour backward displacement of the fundus. If the patient *rise too soon* while the uterus is still large and heavy and the uterine supports correspondingly lax and weak, the tendency to displacement is increased.

The cause of retroflexion in nulliparæ is obscure.

SYMPTOMS.

Local Symptoms of Dysmenorrhœa.

The following are the more important local symptoms:—

Weakness in the back,
Symptoms of chronic pelvic peritonitis,
Painful defæcation;

Leucorrhœa,
Dysmenorrhœa,
Menorrhagia;

Sterility,
Abortion.

In long-standing cases, there may follow the train of general constitutional symptoms consequent on chronic uterine disease.

The symptoms are arranged in three groups:—the first, including those which are more or less continuous; the second, those which are within the menstrual period, variable or periodic; the third, those connected with the function of reproduction.

The connection between the symptoms present in cases of retroflexion and the displacement itself has given rise to much discussion and difference of opinion; and here we must emphasize what was said on page 346 that the symptoms are not due to the lesion immediately but to other pathological changes consequent on or associated with it. Herman[1] would refer the symptoms in displacements entirely "to weakness and over-stretching of the muscular and ligamentous tissues which support the uterus," but we cannot thus ignore chronic metritis and endometritis and the disturbances of menstruation and reproduction. On the other hand, in judging of the symptoms of retroflexion we must keep before us Vedeler's[2] statistics, who found in 40 p.c. of cases of retroflexion no symptoms, and concludes that every degree of retroflexion may exist either with or without symptoms.

Weakness in the back is the most common complaint. It may amount to actual pain, which is aggravated on muscular exertion and generally at the menstrual periods. The symptoms of *chronic pelvic peritonitis* are usually present; the feeling of weight and discomfort in the pelvis is sometimes due to the stretching of old adhesions. The importance of pelvic inflammation, fixing the uterus in its abnormal position and preventing its replacement, we shall consider under treatment. *Painful defœcation* with tenesmus is explained by the relation of the loaded rectum to the retroflexed uterus; irritation from pressure of the fundus against the wall of the rectum may produce straining efforts, but this is very rare.

The *leucorrhœa* is due to chronic inflammation of the mucous membrane. As the result of the displacement, there is passive congestion of all the tissues of the uterus; this leads in the first instance to a simple hypersecretion of mucus, which gradually passes into chronic inflammation. The mucous secretion is more marked immediately after the increased congestion of the menstrual period; but, gradually, it spreads itself over the intermenstrual period. *Dysmenorrhœa* is not so frequent a symptom here as in anteflexion; the explanation is, on the mechanical theory, that retroflexion usually occurs in multiparæ where the cervical canal is patulous. *Menorrhagia* forms one of the more prominent symptoms; it is due partly to the chronic inflammation of the mucous membrane, partly to obstruction to the return of the blood from the uterus.

Affection of Reproductive System.

The *reproductive function* is variously and seriously affected. This is brought under our notice when retroflexion occurs in one who has already been pregnant, and presents an obstacle to conception or at least to the growth of a fertilised ovum in the uterus. Sometimes a patient tells us that she had a child several years ago; that she has suffered from pain in the back, leucorrhœa, and irregular menstruation since that time and has never conceived again. With this history, we may find retroflexion of the uterus although often it is the tubes that are at fault.

The *sterility* may, of course, be due to a variety of causes—the altered position of the cervix, the increased mucous secretion, obstruction of the Fallopian tubes, malposition of the ovaries. We cannot therefore be sure of curing the sterility by replacing the uterus, although we frequently find that the patient *does* conceive shortly after this treatment. After conception has taken place, there is the further risk of *abortion;* with a history of repeated abortion, we sometimes find retroflexion. Conception probably often takes place in a retroflexed uterus, which afterwards may right itself so that pregnancy goes on to the full time. Abortion is due to the inability of the uterus thus to right itself, or to the pathological condition of the mucous membrane which prevents the ovum from becoming securely attached. When abortion does not occur and the pregnant uterus does not straighten itself so as to grow upwards into the abdomen, it enlarges without the undoing of the flexion; in this case it will expand more and more into the hollow of the sacrum and become wedged below the promontory. This constitutes Retroflexion of the Gravid Uterus.

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[1] The Pathological Relationship of Uterine Displacements: Brit. Med. Jour., 1888, I., p. 1213.
[2] Retroflexio Uteri: Archiv f. Gyn., Bd. XXVIII., S. 228.

Abortion in Retroflexion.

DIAGNOSIS.

On *vaginal* examination the cervix is felt low down in the pelvis, the cause of which has been explained under Pathology. The os looks directly downwards. A firm round body is felt in the posterior fornix, continuous with the cervix uteri but separated from it by a groove more or less distinctly marked according to the amount of flexion. Place the forefinger on the cervix, and the middle finger on this body; on moving the former, the latter moves with it.

But a fibroid tumour of the posterior wall would produce similar conditions; therefore make the *bimanual* examination. First place the vaginal fingers in the anterior fornix and make pressure with the external hand until the fingers of both hands meet; there is nothing between them except the abdominal and vaginal walls, the fundus is therefore not to the front. Now put the vaginal fingers into the groove behind the cervix, or, better still, lay hold of the cervix with the index finger in front of it and the middle finger in the groove behind (see fig. 212), and lift up the uterus as high in the pelvis as possible; make pressure with the external hand until the cervix lies fairly between the hands; the upper surface of the uterus is felt to curve backwards. In a favourable case (with lax abdominal walls) we can do the bimanual examination on a still deeper plane, and get both hands to meet behind or at least fairly embrace the retroflexed fundus. Having ascertained that the fundus uteri is retroflexed, we ask ourselves whether it be fixed or movable—*whether it can be replaced or not.* In making our diagnosis we at the same time take a step towards treatment. To ascertain the mobility of the fundus, make steady pressure on it upwards; observe whether it gives way before the finger, and whether, on its yielding, the flexion becomes undone or the uterus simply rotates as a whole; note also whether this manipulation causes pain.

Rectal examination in Retroflexion.

The *rectal* examination has this advantage, that the finger passes upwards over the free surface of the fundus without displacing it. It is indispensable in cases where the rigidity of the abdominal walls prevents our getting the uterus between the hands in the Bimanual. The drawing down of the uterus with the volsella is an additional help in such cases, as it enables the finger in the rectum to reach the fundus.

Uterine Sound in Retroflexion.

The *sound* confirms the diagnosis in doubtful cases, and tells us further whether the retroflexed uterus is enlarged. Before using the sound, we must palpate the uterus carefully to ascertain that it is not becoming enlarged with a growing ovum and inquire as to the patient's menstruation. We curve the sound to correspond with the degree of flexion ascertained on bimanual examination. If introduced with the concavity directed backwards, it passes into the uterine cavity without our having to make the rotation (*v.* fig. 86); through the posterior fornix, we feel the end of it in the retroflexed fundus; it usually passes in beyond the two and a half inches. We can also learn from the sound whether the uterus can be replaced or not; but it is better to get the information from the bimanual examination. The sound is of most use in differential diagnosis.

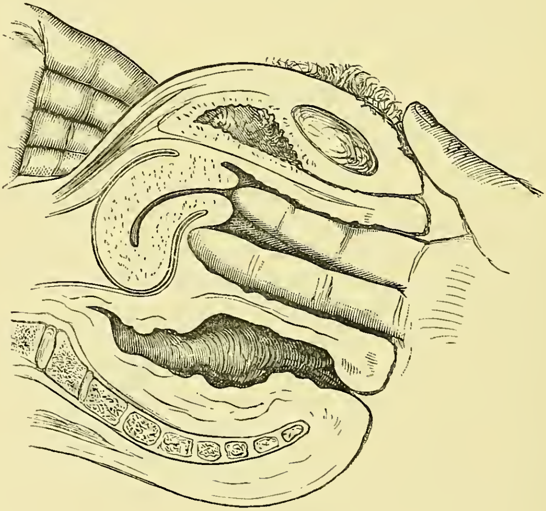

Fig. 212.

Diagnosis of Retroflexion by Bimanual Examination.

Differential Diagnosis of Retroflexion,

Differential diagnosis. The following are the conditions arranged in the order of frequency, which might be mistaken for retroflexion :—

Fæces in the rectum ;

Pelvic deposit in the pouch of Douglas { Peritonitis, Hæmatocele, Carcinoma ;

Cellulitis behind the cervix ;
Myoma of the posterior wall ;
Prolapsed ovary or small ovarian tumour.

from loaded Rectum,

Fæcal matter in the rectum gives rise to difficulty only on superficial examination. We should always decline to give an opinion as to the condition of the pelvic organs when the rectum is loaded. If this be attended to, no mistake in diagnosis will be made under this head.

from Pelvic Deposit,

Pelvic deposit in the pouch of Douglas gives rise to more difficulty, because it may closely simulate the condition found in retroflexion—'a body felt through the posterior fornix and moving along with the cervix.' Such a deposit will be proved not to be the fundus uteri by our finding the latter in another position. If inflammation is present, it is difficult to make the examination necessary to ascertain this; we may not be justified in using the sound just where it would give us the desired information : such cases present great difficulty in diagnosis, and the true condition can only be ascertained on repeated examination or after the inflammation has subsided.

from Cellulitis,

Cellulitis behind the cervix is rarely present in such a form as to give rise to a mistake in diagnosis, unless the inflammation renders the necessary examination difficult.

from Myoma,

A *myoma* projecting posteriorly from the lower segment of the uterus resembles, in form and firmness, the retroflexed fundus. On bimanual examination, however, we find that we have between the hands a larger body than the uterus alone. The fundus may also be felt to the front, and distinct from the tumour. To ascertain its position, it is best to make the bimanual examination with the sound in the cavity of the uterus. Fig. 204 shows the information given by the sound, if we suppose that the structure to the left of the figure is the rectum. A fibroid tumour accompanied by inflammation presents great difficulty.

from Prolapsed Ovary.

If the *ovary* be *prolapsed*, enlarged through inflammation, and adherent to the posterior aspect of the uterus, it simulates (on vaginal examination) the retroflexed fundus. So also does a small *ovarian tumour* lying in the pouch of Douglas, though it is softer and more elastic than the uterus. The bimanual examination, supplemented if necessary by the use of the sound and the drawing down of the uterus with the volsella, enables us to ascertain the exact position of the fundus and its relation to the tumour.

PROGNOSIS.

The prognosis depends upon the mobility of the uterus, and the possibility of replacing it. It is always less favourable where inflammation is present; though we have seen considerable exudations become after a time absorbed, and the uterus again movable so that it could be replaced. As regards the probability of future conception, our statements should be guarded; though the probabilities are increased if we can replace the uterus.

Possibility of cure of Retroflexion.

Whether a permanent cure of the displacement (so that the uterus will keep its normal position after the instrument is removed) is often effected, we have not much definite information. *A priori*, we should not expect that the stretched utero-sacral ligaments would readily become shortened again unless a pregnancy supervene. The curability of the retroflexion depends, according to Mundé, on the *recency of the displacement;* "recent displacements of any variety are the only cases which offer a fair chance of complete recovery by any of the mechanical means at our disposal." The length of time during which a pessary must be worn so as to effect a cure of recent puerperal retroflexion is, according to Mundé, six months to a year.

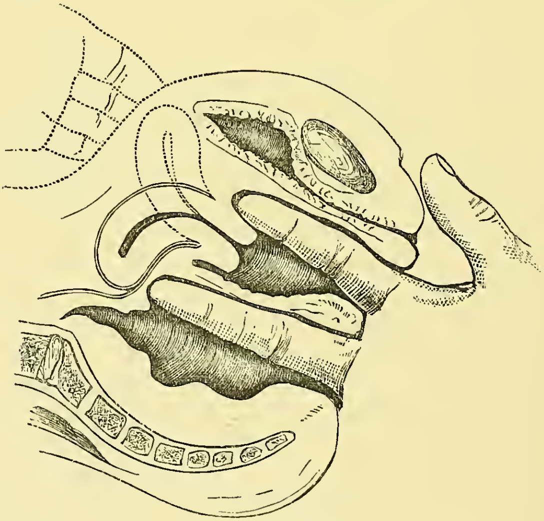

Fig. 213.
Reposition of the Retroflexed Uterus by the Finger in the Rectum.

TREATMENT.

This consists of two parts :—

1. Replacement of the retroflexed uterus ;
2. Retention of it in its normal position by suitable means.

The first question which suggests itself on discovering a retroflexion is, whether we can replace the uterus ; this has been ascertained at the same time as we made the diagnosis.

The two obstacles to treatment are the presence of existing inflammation and the fixation of the uterus in its abnormal position. The former must be treated by blistering, hot-water injections, and the use of the glycerine plug ; these may have to be continued for a month or more, and then we may attempt the reposition. This last may be impossible through the firmness of the flexure or the presence of old adhesions. It must be left to the operator to determine how much force he is justified in employing. Sometimes it is necessary to put the patient under chloroform. In cases where we cannot replace the uterus, benefit may be derived from simply supporting it with a pessary.

Schultze recommends the breaking of adhesions by recto-abdominal manipulation under an anæsthetic—not aiming at forcible reposition, but purely at the loosening of the adhesions through careful bimanual stretching.

Method.—Bladder and rectum are empty ; dorsal posture, thighs flexed and abducted. Irrigate the rectum with warm water. With the index and middle fingers in rectum and the external hand grasping the fundus, lift the uterus carefully up. Slight adhesions yield to pressure of fingers ; broader ones are stretched by the ends of the fingers, although repeated attempts may be necessary. A pessary introduced after reposition. He also attempts to replace adherent prolapsed ovaries in same way.

Let us suppose that we are treating a case suitable for reposition, after inflammation has subsided.

1. *Methods of Replacing the Retroflexed Uterus.*

These are the three following :—

(1.) By bimanual vagino-rectal manipulation ;
(2.) With the sound ;
(3.) By genupectoral posture, combined with traction on the uterus with the volsella and (if necessary) pressure on the fundus with the finger in the rectum.

Reposition of Retroflexed Uterus by Bimanual.

(1.) The bimanual manipulation is the safest method, and can be at once proceeded with as soon as we have diagnosed the pathological condition ; owing however to its causing more discomfort to the patient it is not so much used. The replacement is best effected with the index finger in the vagina and the middle finger in the rectum. If with both fingers in the vagina we make pressure through the fornices, we simply push the uterus, as a whole, upwards. With the finger in the rectum, however, we get behind the uterus and push it forwards. Place the patient in the dorsal position; pass the fingers into the vagina and rectum, as in the accompanying diagram (fig. 213). Make steady gradual pressure on the posterior surface of the fundus with the middle finger. Direct the pressure to one side of the middle line, so as to keep the fundus clear of the promontory of the sacrum. With the index finger placed *in front of the cervix*, push it backwards and thus rotate the fundus forwards. Having by this manœuvre brought the fundus uteri to the front (into the position indicated by the dotted line in the diagram), make with the external hand steady downward pressure so as

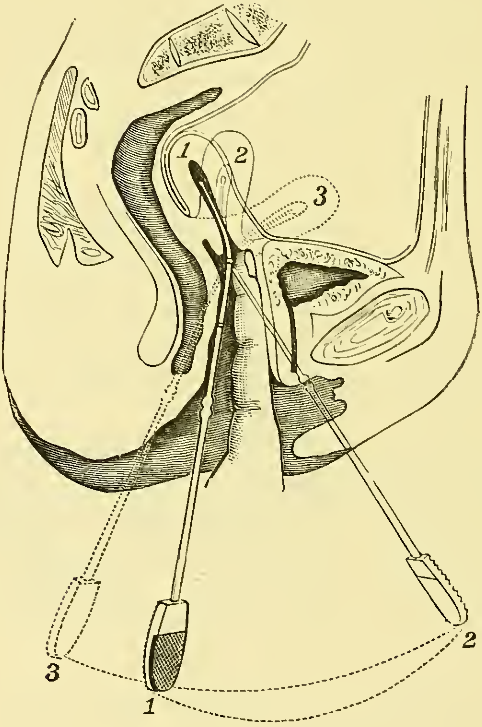

Fig. 214.

Replacement of the Uterus with the Sound. 1, 2, 3, the successive positions of the Sound and of the Uterus.

to get between it and the hollow of the sacrum and thus depress the fundus still more to the front. A glycerine plug is now placed in the vagina to keep the uterus in position. The plugging should be chiefly in the anterior fornix, so as to exert upward pressure on the cervix and thus favour the tilting of the fundus forwards. On the following day, if there be no indication of inflammation, a pessary may be introduced.

Replacement with the Sound.

(2.) Replacement with the sound has the advantage that it causes less discomfort to the patient; it is therefore the method generally employed. We may have the sound already in the uterus to make sure of our diagnosis, and (without withdrawing it) we can proceed at once to effect the reposition. In the employment of force we require to be more careful than in the bimanual manipulation, because the sound gives us greater leverage, pressure is being made on the mucous membrane of the uterus, and there is not the same delicate sense of resistance as when the finger is immediately in contact with the uterus. The end of the sound should not be too much curved. If the flexion be pretty acute, so that the sound requires to be well curved to pass easily into the body of the uterus, we should first reduce the acuteness of the flexion by repeatedly passing in the sound more and more straightened. Having by this means partially converted the retroflexion into a retroversion, we proceed to reposition as follows. The sound lies as in position 1 in the figure (fig. 214): the direction of the handle is backwards, and the roughened face looks to the back; the intra-uterine portion (1) also has the curve backwards. Now lay hold of the handle loosely, rather allowing it to lie between the fingers than grasping it. Carry the handle upwards towards the patient's right buttock (as she is on her left side) forwards with a wide sweep and downwards again towards the couch, the shaft describing half of a cone. The sound thus comes to lie in position 2 in the figure: the direction of the handle is forwards, and the roughened face is now to the front; the intra-uterine portion of the sound has also rotated, so that the curve is now forwards, but the uterus as a whole is still to the back (fig. 214, 2, 2). Now carry the handle of the sound gently and slowly backwards, in a straight line towards the perineum. The sound now lies in position 3: the roughened surface is to the front, and the handle is now directed backwards; the fundus uteri is consequently in its normal position (fig. 214, 3). The reason for this manipulation is evident. If we rotated the handle of the sound forcibly round its long axis (bringing it at once from position 1 to 3), the intra-uterine portion would describe a wide curve within the uterine body and probably produce laceration of the mucous membrane. Before withdrawing the sound we make sure by external palpation that the fundus uteri is to the front, as the latter is more easily felt when stiffened by the sound. After withdrawal of the sound, the uterus must be kept in position by the glycerine plug or pessary. Frequently we find that the uterus falls back into its abnormal position as soon as the sound is withdrawn; in such cases, the pessary should be slipped in over the handle of the sound and put in position before the latter is withdrawn.

Various forms of uterine repositors have been devised by Sims and others. They might be compared to a sound having the intra-uterine portion jointed to the stem, on which it can be rotated antero-posteriorly by a suitable mechanism. They are not of such practical value as to require further description here. No mechanism can equal the fingers in nicety of action.

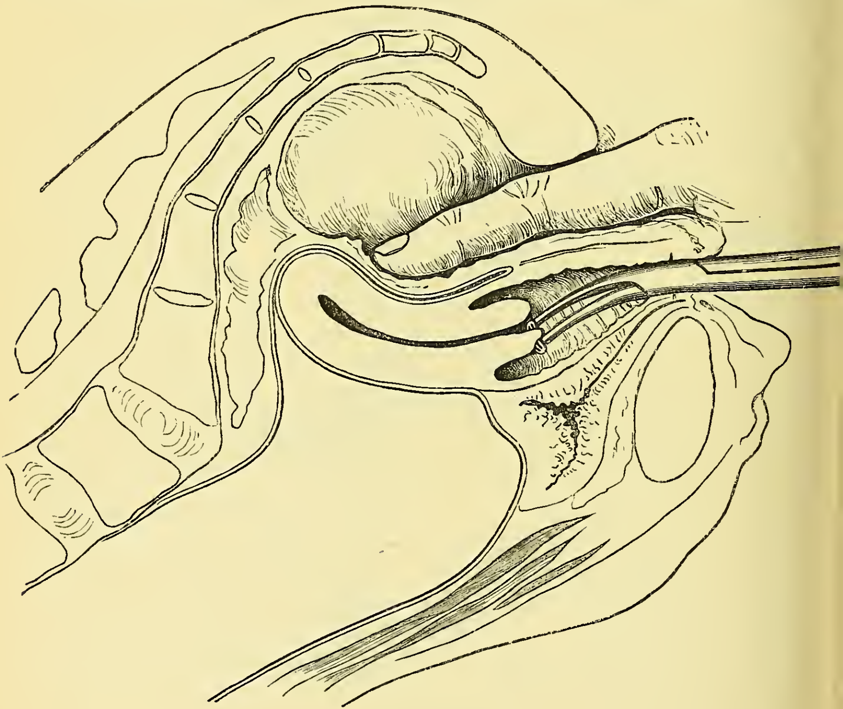

Fig. 215.

Replacement of the Uterus with the Volsella and the Finger in the Rectum; the patient is in the genupectoral position.

(3.) The importance of the genu-pectoral posture in replacing the retroflexed uterus has been brought forward by H. F. Campbell. On placing the patient in this posture, the abdominal contents gravitate downwards and forwards; this displacement withdraws the internal pressure from the pelvic floor, so as to subject it to the atmospheric

The Retroflexed Uterus in Genupectoral Posture.

pressure from without. If the vaginal orifice be now opened, the vaginal cavity becomes distended with air; if the walls are lax, the cavity may be so large that the finger reaches the cervix with difficulty. The position of the uterus changes;[1] but the retroflexed uterus does not become replaced, as Campbell supposed. It moves as a whole near the sacrum; and, if already retroverted, it becomes still more so. To effect replacement, we must either push the fundus forwards or draw the cervix backwards. It is best to combine these actions; having laid hold of the cervix with the volsella per vaginam, we draw it downwards while with the index finger of the right hand, per rectum, we press the fundus towards the bladder (see fig. 215). This method of reposition is only used in cases of retroflexion of the gravid uterus.

Having replaced the uterus by one of those methods, we have to retain it in its normal position.

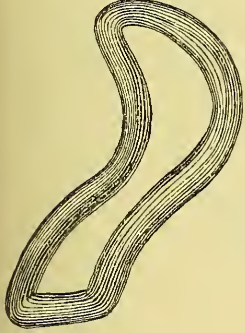

FIG. 216.
HODGE PESSARY.

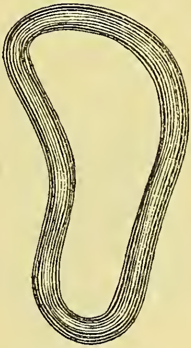

FIG. 217.
ALBERT SMITH PESSARY.

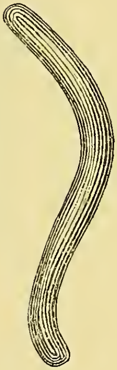

FIG. 218.
SIDE VIEW OF ALBERT SMITH PESSARY. The Hodge is similar, but has the lower curve less marked.

2. *Methods of Retaining the Replaced Uterus.*

The retention of the uterus in its normal position is effected by vaginal pessaries. Of these the best forms are the Hodge or, its modification, the Albert Smith.

Material of Pessaries.

The *material* of which they are made is vulcanite, which is light and smooth and not affected by vaginal discharges. To bend the vulcanite, the pessary should be placed in hot, almost boiling, water. It is thus made pliable and can be moulded to the desired form, but becomes firm again on placing it in cold water; this is also effected by oiling the pessary and heating it in a spirit lamp. Pessaries are also made o gutta-percha, which has the advantage of being easily moulded; these cannot, however, be worn for a long time, as the gutta-percha is absorbent and, retaining the secretions, sets up irritation. The patient can wear one for a few weeks till we see that it fits comfortably and is effective, and then we can substitute one of a similar form made of vulcanite. Celluloid pessaries are now sometimes used instead of vulcanite ones.

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[1] For full account of changes produced by the genu-pectoral posture, the student should consult the Atlas of the "Relations of the Abdominal and Pelvic Organs in the Female:" *Simpson and Hart*, 1881.

The Hodge Pessary.

The *form* of the Hodge is an elongated horse-shoe, with a straight transverse bar joining the free ends. Seen from the front (fig. 216), it has a curved upper end which is adapted to the posterior fornix; the lower end consists of a straight bar which serves to keep the sides apart, and lies under cover of the symphysis pubis; the external angles of this end are rounded to prevent their cutting the vagina; the sides run almost parallel. Seen from the side (fig. 218), it is a mould of the vaginal slit; there is an upper sacral curve, which is long and well-marked; there is a lower pubic one, which is not necessarily present or is only slightly marked. The pessary lies so that the concavity of the sacral curve looks forward, that is to say, the upper end of the pessary

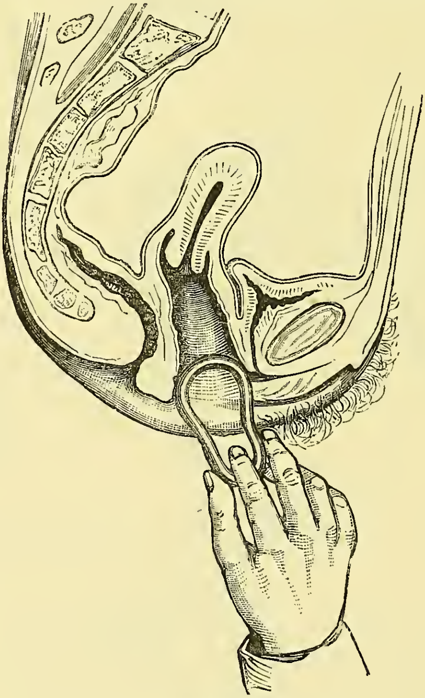

Fig. 219.
Introduction of Pessary, First Stage.

The Albert Smith Pessary.

(like the posterior fornix vaginæ) curves forwards. The Albert Smith (fig. 217) contracts in its lower half to a more or less beak-shaped end; seen from the side, it has the pubic curve more marked (fig. 218). Scientifically it is the more correct form, because the posterior wall of the vagina is narrower below than it is above. The lower end should not be too much contracted, otherwise it is apt to interfere with married life; also when the vaginal orifice is wide, it favours the expulsion of the instrument. A second modification of the Hodge is recommended by Thomas, in which the upper bar is thicker, the sacral curve more pronounced, and the whole instrument longer.

Choice of Hodge Pessary.

The *choice of an instrument* suitable to the case must be made. The pessary should be narrower and shorter than the posterior vaginal wall, so that it produces no tension when it is in position. The upper bar should be of such a size that it can be passed in easily; the lower should be narrower than the upper, but not too narrow for the reasons given above. The proof of a good fitting instrument is that the patient does not feel its presence, nor should it interfere with married life.

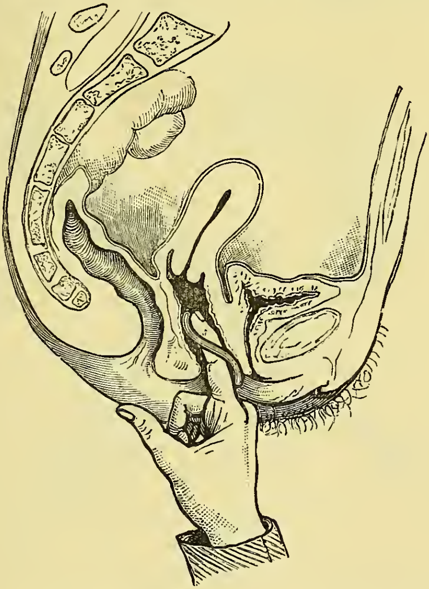

FIG. 220.
SECOND STAGE: PESSARY CARRIED ON BY FINGER.

Mode of Introduction of Hodge Pessary.

The *mode of introduction* of the pessary demands special attention. It is important that this apparently simple manœuvre be effected without causing pain to the patient. From the fact that the vulvar orifice is antero-posterior while the cavity of the vagina is transverse, the instrument must be introduced with its plane surface horizontal (the patient is supposed to be on the side) and afterwards rotated so that this comes to be vertical. From the position of the cervix, the instrument is very liable to run into the anterior fornix. When in position the upper end must curve forwards. Having oiled the instrument, grasp it with the lower end (the square end in the case of the Hodge, the narrower end in the case of the Albert Smith) between the finger and thumb of the right hand. Separate the labia with the first and second fingers of the left hand; when the vaginal orifice is narrow, hook back the fourchette with one finger or get the posterior corner of the end which is being introduced within the vaginal orifice; and press back the perineum with it so that the anterior corner is not pushed against the clitoris or vestibule. Now push the pessary backwards in the axis of the vagina till it is half within the cavity (see fig. 219), and rotate it so that the concavity of the sacral curve looks forwards. Pass the index finger behind the instrument into the vagina, and place the tip of it against the upper bar; carry the pessary onwards, keeping the upper bar well against the posterior vaginal wall to prevent its slipping up in front of the cervix (fig. 220).

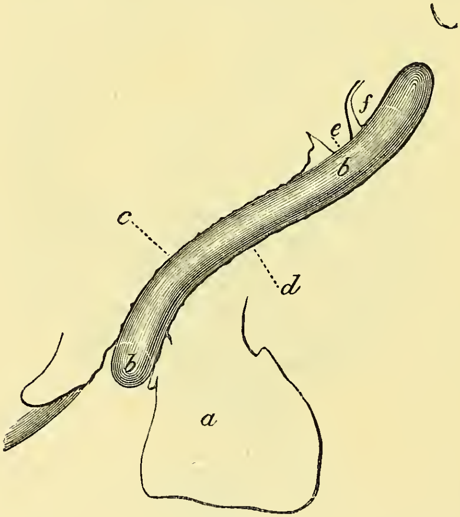

Fig. 221.

Pessary *in situ* in the Vagina, *ad naturam*. *a* perineum, *bb* pessary, *c* anterior and *d* posterior vaginal wall, *e* anterior and *f* posterior lip of cervix.

How the Hodge Pessary lies when *in situ*.

The *position* and *action* of the pessary when *in situ* are as follows. It lies exactly adapted to the vaginal walls (see fig. 221); the upper end being in the posterior fornix behind the cervix, the lower just within the vaginal orifice. It is kept in position through its resting on the oblique anterior face of the sacral segment of the pelvic floor, against which it is compressed by the posterior face of the pubic segment.

The student will readily understand and remember the position of the pessary in the following way. Hold the hand inclined as in fig. 222, with the palm slightly inflexed. It resembles the posterior vaginal in the following points:—(1) It is broader above than below; (2) it curves forwards above; (3) from its obliquity, it allows the pessary to sit on it. Now place the pessary on it. It will only lie adapted to the hand when the broad end is above and the upper curve is directed forwards.

Action of the Hodge Pessary.

The Hodge pessary does not act as a lever; that is to say, the intra-abdominal pressure does not act specially on the lower bar and depress it, causing the superior one to rise. The intra-abdominal pressure acts nearly equally on both bars, of which fact the student may satisfy himself clinically. Its action is that the *upper bar gives a point d'appui to the posterior fornix*. The posterior vaginal wall runs round the upper bar as on a pulley, and, as it is inserted into the cervix, the latter is thereby drawn upwards and the fundus thrown forwards (fig. 223). The pessary, therefore, has the same action as the utero-sacral ligaments, if we suppose that these keep the cervix backwards. This is only the action in the case of a retroverted uterus which has been replaced. A vaginal pessary, however, gives relief even though we may not be able to replace the uterus. In this case we may suppose that it acts by

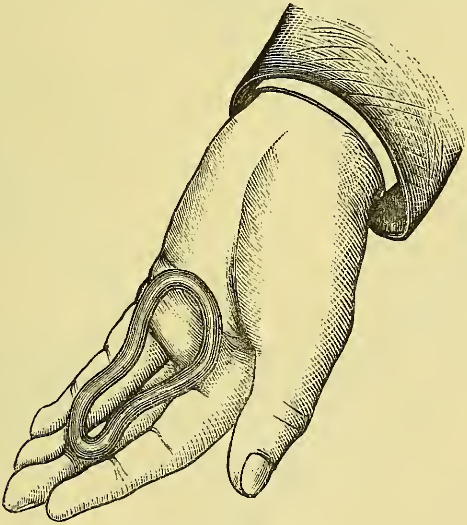

Fig. 222.
Hand holding Albert Smith Pessary.

supporting the uterus as a whole, thus diminishing tension on the ligaments and passive congestion.[1]

Another way of showing how the Hodge pessary acts is as follows. With the patient lying on her left side, pass the index finger into the posterior fornix vaginæ and push it up in a direction parallel to the posterior vaginal wall. This necessarily pulls the cervix back, and thus the fundus is kept forward. In other words, if the cervix be thus kept back by the tension of the finger in the posterior fornix, the uterus cannot become retroverted although the fundus may become retroflexed.

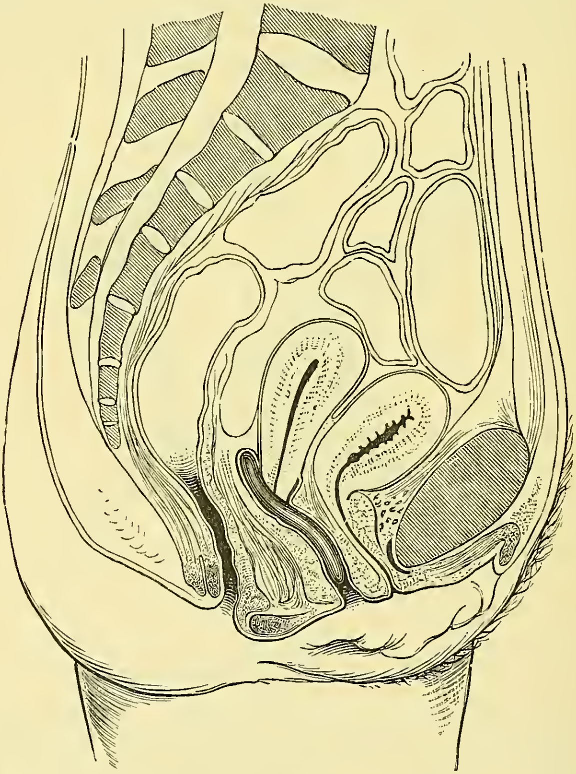

Fig. 223.
Position and Action of Pessary.

Now if a Hodge pessary be passed into position and held by the hand, it will act just as the finger does. It does not require to be held, however, as it rests on the oblique sacral segment and is pressed against it by the pubic segment and abdominal viscera. Note that the pressure on the Hodge is at right angles to the posterior vaginal wall; there is no side to side pressure on the instrument, and thus it does not require to extend from side to side of the vaginal walls.

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[1] See Granville Bantock on *The Use and Abuse of Pessaries*, London, 1884; Hart on *The Structural Anatomy of the Female Pelvic Floor.*

The after-watching of the case is important. The patient should be instructed to return in two days to see that the instrument is in place, and to return at once if it causes pain. After this she should report herself occasionally, say at intervals of a month, when examination is made to ascertain that the uterus keeps its place. If she uses hot-water injections occasionally, it is not necessary to remove the instrument to clean it more frequently than this. After the pessary has been worn for some months, it may be removed to see if the uterus remains in position without it. Sometimes we find that the uterus falls back again into its abnormal position as soon as the instrument is withdrawn; in such a case, it must be introduced again and may have to be worn for years.

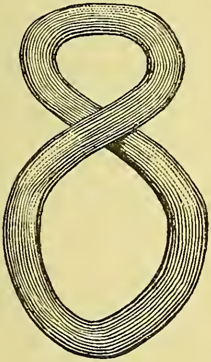

FIG. 224.

SCHULTZE'S PESSARY.

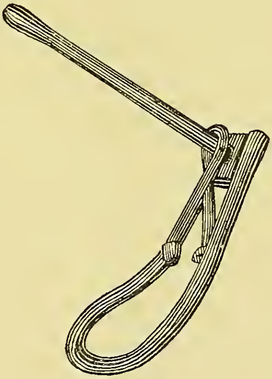

FIG. 225.

MEADOW'S COMPOUND STEM PESSARY.

Should conception occur, the pessary may be worn till the fourth month, after which the uterus rises above the brim and there is no longer reason to fear displacement.

Schultze's Pessary.

In Germany, Schultze's pessary (fig. 224) is the one in general use. It has the form of a figure of eight, the upper ring embracing the cervix. It is interesting to note that it also goes on the principle that the pessary acts on the cervix, not the body of the uterus.

In some cases the uterine tissue is flaccid at the angle of flexion, and the body falls to the back or front as if it were jointed to the cervix. Here the Hodge, which acts on the body through the cervix, does no good; the intra-uterine stem, along with a Hodge which has transverse bars, is suitable for some of these cases. Wynn Williams, Meadows (fig. 225) and Routh have devised good forms of pessary on this principle.

Their use has recently been again advocated by Routh,[1] but the general opinion of gynecologists in this country is against intra-uterine stem pessaries.

Hodge's Pessary good only in Retroversion.

From what has been said on the action of the Hodge pessary, it is evident that in the treatment of Retroversion + Retroflexion *the version alone is affected by the pessary.* Whether the flexion is remedied will depend on the state of the uterine walls and the effect of intra-abdominal pressure upon them.

For illustrative examples showing the value of pessaries in suitable cases, the student may consult Bantock's monograph, or Macan's translation of Schultze.

Operations for Retaining the Uterus in position.

In many cases pessaries fail to keep the uterus in position, and ingenuity has of late been exercised in devising operative measures for this. These must be held as *sub judice*, for two reasons: We cannot *a priori* affirm that the symptoms were due to the displacement; and the cases have not been followed for a sufficient number of years to judge from their results alone that such operations are called for. Three methods of acting on the uterus have been tried: (*a*) Through the vagina, by causing cicatrisation to pull on the cervix; (*b*) through the round ligaments, by shortening them and then pulling the uterus forwards; (*c*) through peritoneal adhesions, by tacking the fundus to the anterior abdominal until it becomes fixed there.

Under the first of these methods, we have to notice an operation by von Rabenau. In cases where a pessary cannot be borne or where it will not keep the uterus to the front, he amputates the anterior lip high up, and says that the resulting contraction causes the uterus gradually to become anteflexed. Six cases treated thus are reported on,[2] but they were not observed over a long enough period to pronounce on the ultimate result.

The second method is known in this country as the Alexander-Adams operation. It will be described under Prolapsus Uteri, as it is used for the treatment of prolapse as well as retroversion.

The third method has been tried by various operators—Koeberlé (1877), Olshausen (1879), Lawson Tait and Heywood Smith (1880), and Kelly (1885). After Olshausen[3] called attention specially to the operation by reporting on two cases, we find Klotz[4] recording seventeen, Sänger[5] seven, Lee[6] six, and Leopold[7] nine. Different methods of attaching the uterus to the abdominal wall have been tried: fixing one or both pedicles (after removal of the uterine appendages) into the abdominal incision; stitching the round ligaments to the abdominal wall; or Leopold's method (probably the best) of carrying three of the sutures, used to close the abdominal incision, also through the upper anterior aspect of the fundus (the surface of the fundus to be apposed to the wall was scraped so as to ensure better adhesion, but Leopold is not sure that this is necessary). The cases in which this operation has been done are (1) when the appendages are being removed at any rate, and the uterus is found retroflexed; (2) when ovarian or fibroid tumours which have produced permanent retroflexion are being removed; (3) when there is retroflexion alone, causing serious symptoms and incurable otherwise through adhesions. The greatest difficulty is in the separation of adhesions—especially when they are tough and numerous and implicate the bladder and ureters or rectum. The results in Leopold's cases as to relief of symptoms were satisfactory, but it is evident that the scope for such an operation must be very restricted.

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[1] On the various modes of treatment of the worst cases of uterine flexions: *Brit. Gyn. Trans.* 1888, p. 229.

[2] Ueber eine neue operative Behandlung der Retroflexio Uteri: *Centralb. f. Gyn.* 1886, p. 429.

[3] Ueber ventrale Operation bei Prolapsus und Retroversio Uteri: *Centralb. f. Gyn.* 1886, p. 698.

[4] *Centralb. f. Gyn.* 1888, S. 11.

[5] Ueber operative Behandlung der Retroversio-flexio Uteri: *Centralb. f. Gyn.* 1888, S. 17.

[6] The value of Hysterectomy in the Treatment of Retroflexions of the Womb: *Americ. Journ Obstet.* 1888, p. 1249.

[7] *Sammlung klinischer Vorträge*, No. 333.

Apart from stitching the uterus to the wall, some have tried, after they have done laparatomy for releasing the retroflexed uterus from adhesions, to keep it to the front by means of the glass drainage tube passed into the pouch of Douglas and the consequent adhesions set up along the tract of the tube. Polk records four cases in which he did this; and Klotz used the tube in addition to fixing the pedicles of the uterine appendages in the abdominal incision. Another method of producing adhesions anterior to the uterus has been tried by Schücking,[2] who passes a curved guarded needle into the uterine cavity like a sound; the point is then extruded so as to go through the anterior wall, the utero-vesical peritoneum and the anterior fornix of the vagina. The thread carried through is knotted and left for ten to fourteen days, and by its irritation sets up adhesions in the utero-vesicle pouch. In eleven out of twelve cases of retroflexion treated thus, a permanent anteflexion was produced.

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[1] Laparotomy for Adherent Retroflexed or Retroverted Uterus: *Americ. Journ. Obstet.* 1887, p. 630.

[2] Die vaginale Ligature des Uterus und ihre Anwendung bei Retroflexio und Prolapsus uteri: *Centralb. f. Gyn.* 1888, S. 682.

CHAPTER XXXIV.

INVERSION OF UTERUS.

LITERATURE.

Atthill—Inversion of uterus due to fibroid tumour : Dublin Medical Journal, Feb. 1879. *Aveling*—On Inversion of the Uterus : Brit. Med. Journ. 1886, I., p. 475. *Barnes*—Diseases of Women : London 1878, p. 721. Med. Chir. Trans, 1869. *Crosse*—An Essay, literary and practical, on Inversio Uteri : Trans. Provincial Med. and Sur. Assoc., London 1845. *Duncan, Matthews*—On the Production of inverted Uterus : Edin. Med. Jour., May 1867. *Emmet*—Principles and Practice of Gynæcology : Churchill, London, 1884, p. 406. *Fritsch*—Die Lageveränderungen der Gebärmutter : Billroth's Handbuch für Frauenkrankheiten : Stuttgart 1881. *M'Clintock*—Diseases of Women : Dublin 1863, p. 76. *Macdonald*—Two cases of chronic inversion of the uterus : Edin. Obst. Trans. Vol. VI., p. 170. *Spiegelberg*—Zu den Inversionen der Gebärmutter : Archiv f. Gyn., B. IV. S. 350, and B. V. S. 118. *Thomas*—Diseases of Women, p. 453, Philadelphia 1880. *Werth*—Ueber partielle Inversion des Uterus durch Geschwülste : Archiv f. Gyn., Bd. XXII. S. 65. See also Index of Recent Gynecological Literature in the Appendix. The essay by Crosse gives the fullest anatomical description of inversion, and contains a series of lithographic plates of specimens.

PATHOLOGY.

In inversion the uterus is turned inside out, so as to form a polypoidal projection into the vagina ; its peritoneal surface is converted into a cup-shaped hollow ; its mucous membrane becomes *everted* so as to lie exposed on all sides in the cervix and vagina.

The mechanism by which this condition is brought about is the following.

1. A portion of the muscular wall of the uterus *having lost its tone*, becomes depressed towards the uterine cavity. In the puerperal condition this is usually that portion of the wall to which the placenta has been attached, and the condition has been described by Rokitansky as "paralysis of the placental seat;" this partial inversion will be frequently found on abdominal palpation in cases of post-partum hæmorrhage (*Fritsch*). In cases of tumour-growth, fatty degeneration (*Scanzoni*) or malignant infiltration (*A. R. Simpson*) weakens the wall of the uterus round the base of the polypoidal growth, and thus produces an analogous condition.

2. *Muscular contractions* of the non-depressed portion of the uterus, combined with *intra-abdominal pressure*, carry the depressed portion further into the uterine cavity, until the fundus reaches the os

internum (fig. 234). In the puerperal condition, muscular contractions occur spontaneously, or are produced by the presence of the placenta; in the case of a polypoidal tumour, they are due to the presence of the foreign body. *Traction from below*, such as the pulling away of the placenta or the tension of the pedicle of a polypus which is being extruded, also produces inversion.

3. The fundus of the uterus, by continuation of the same process, dilates the cervical canal and is "born" into the vagina (fig. 231).

In some cases inversion seems to take place from below upwards with a mechanism similar to that of prolapsus uteri, the lower part of the body of the uterus becomes inverted into the cervical canal (*Taylor*).

Varieties of Inversion.

Matthews Duncan, whose paper was a valuable contribution towards establishing the correct theory of inversion, distinguishes between active and passive inversion. The active is that described above; the passive is produced by inertia of the whole uterus, in which the organ is driven down entirely by intra-abdominal pressure or by traction from below—and not by uterine contractions.

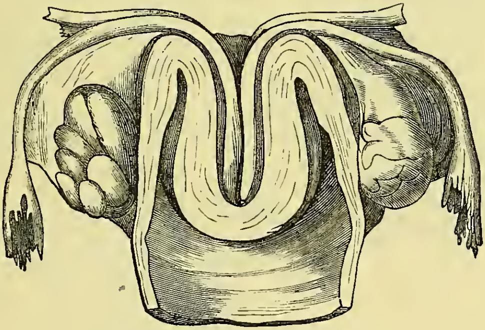

Fig. 226.

Inversion of Uterus (half-size, *Barnes* from *Crosse's* essay). The fundus lies in the vagina; the cervix is not inverted; the lips are flattened out to a swelling seen below the angle of inversion. The ovaries (seen from behind) are not in the peritoneal cup.

It is evident that the process may become arrested at any of these stages and persist as a permanent condition. When it has persisted for a few weeks, it constitutes "chronic inversion;" this is found in the following forms. (1.) Inversion of one horn only is a rare occurrence. Slight inversion of the uterine wall, at the base of a polypoidal fibroid, has been more frequently observed. (2.) Partial inversion, when the fundus has descended as far as the os internum, is also found as a chronic condition. (3.) Complete inversion is the condition most frequently met with.

Anatomy of Inversion.

An exact knowledge of the relation of parts in *complete inversion* is necessary for diagnosis and treatment. This can only be gained by studying the inverted uterus as seen in section (fig. 226). We must study the position of—

The body of the uterus,
The cervix uteri,
The Fallopian tubes and ovaries,
The peritoneum,
The bladder.

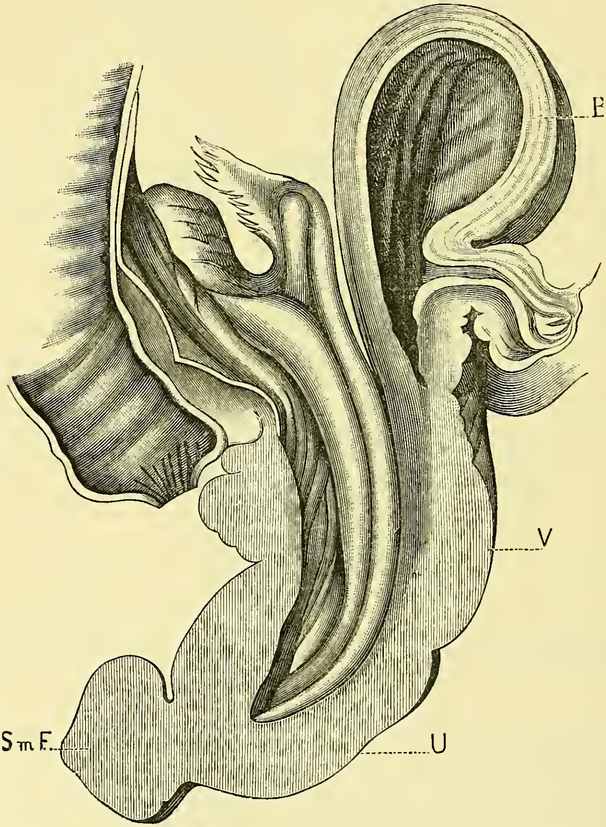

FIG. 227.
INVERSION OF UTERUS+INVERSION OF VAGINA, occasioned by a small sub-mucous fibroid (*M'Clintock*). *Sm F*, sub-mucous fibroid; *U* uterus, *V* vagina, *B* bladder.

The body of the uterus. The inversion extends, in simple uncomplicated cases, as far as the os internum but *no further.* The uterus lies partly in the vagina, partly in the cervical canal. Its neck is embraced by the os externum, which may lie loosely on it (favouring hæmorrhage) or constrict it firmly (favouring gangrene). After involution takes place, it becomes small, rounded and of firm consistence, closely resembling a pediculated fibroid tumour; and it has been amputated by mistake for such. It has a rounded form, is of a softer consistence and deeper red colour than a pediculated fibroid, and has a smooth and slippery surface which bleeds freely when handled. The softness may be so marked that the uterus moulds itself to the vaginal cavity and, becoming flattened against the posterior vaginal wall, takes on a mushroom-like form (*Freund*).

The mucous membrane of the uterus may undergo all the changes of any tumour with a constricted base and exposed surface. It is usually congested and bleeds easily; it may become ulcerated and even gangrenous, or may be hypertrophied with polypoidal formations; it may lose its single layer of cubical epithelium and develop a stratified squamous epithelium. The occurrence of these changes has an important bearing on the necessity of replacing the organ.

The cervix uteri. This is rarely[1] displaced in simple uncomplicated inversion; it forms a broad ring embracing the neck of the tumour. Sometimes the inversion is complicated with prolapsus, or, more properly, the vagina also becomes inverted and the inverted uterus caps the inverted vagina (fig. 227). When this occurs, the cervix uteri is also more or less inverted; a part remains just above the os externum, as a depressed ring which also disappears on making traction on the uterus (*Fritsch*).

The *Fallopian tubes and ovaries*, with some coils of small intestine, may (at first) lie within the inverted cup, which is lined with *peritoneum;* afterwards, they retract out of it. In long-standing cases, the rim of the peritoneal cup is contracted by the muscular fibre of the cervix so as scarcely to admit a finger (fig. 228). In a case of six months' standing, in which A. R. Simpson performed Thomas' operation before having recourse to amputation, the contracted ring just admitted the finger; an ovary was caught within it.

Adhesions rarely form between the *peritoneal surfaces;* this is an interesting fact and is of importance in regard to replacement. We might have expected detachment of the peritoneal lining or tearing of it by the sudden dislocation; the previous stretching of it during pregnancy is perhaps the reason why this has not been noticed. Fritsch says that the lifting up of the fornices by the tumour in the vagina, diminishes the strain on the peritoneum.

The *bladder*, from its relation to the cervix (*v.* Chap. IV.), is not altered in position unless there is prolapsus. When the latter occurs, there is cystocele (*v.* fig. 227). We may therefore contrast the two types of inversion as follows.

Inversion of uterus—cervix and bladder normal in position.

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[1] Crosse figures one preparation in which the cervix as well as the body of the uterus was inverted although there was no prolapsus.

Inversion of uterus + prolapsus (*i.e.*, inversion of vagina)—cervix inverted and cystocele.

ETIOLOGY AND FREQUENCY.

Inversion arises under two different conditions :—

1. In the puerperium—puerperal inversion;
2. Secondary to intra-uterine tumours growing from the fundus.

Inversion has also occurred independent of the puerperal condition and of tumour growth; this is quite exceptional.

Etiology of Puerperal Inversion.

1. *Puerperal inversion.* This is by far the most frequent form; out of 400 cases, 350 occurred in the puerperal uterus (*Crosse*).

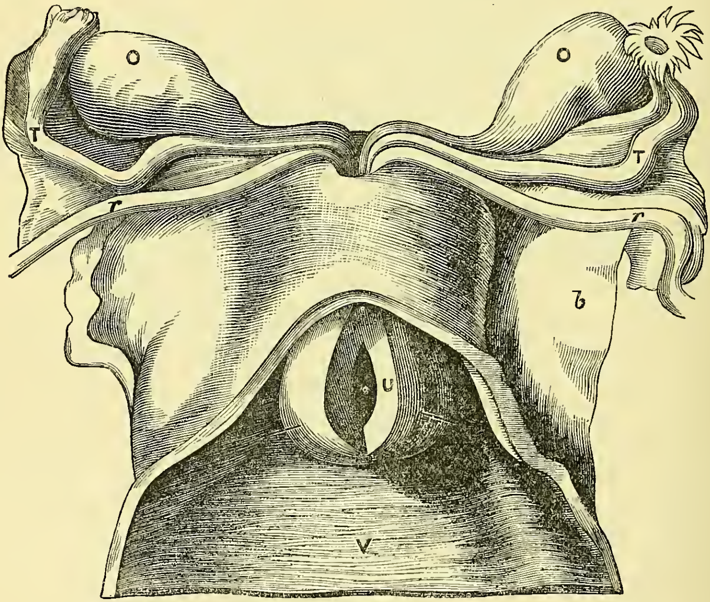

FIG. 228.

INVERSION OF UTERUS (*Crosse*). The inverted uterus (*U*) lying in the vagina (*V*) is cut open to show the peritoneal sac which does not contain the ovaries (*O*); bristles are passed into uterine orifices of tubes. *b* Broad and *r* round ligaments; *T* tube.

Its former frequency was due to improper management of the third stage of labour. When the uterus was flabby and not contracting and the placenta not coming away, the removal of the latter by traction on the cord drew down the part of the wall to which it was attached and thus inverted the uterus. This accident was favoured by the situation of the placenta over the fundus (*Hennig*). Since the removal of the placenta by compression (which is best done by the Credé method—with the thumbs of both hands well down behind the fundus so that the uterus may be firmly compressed antero-posteriorly) has been adopted, this accident has become rarer.

A dilated condition of the uterus (distention by blood clots) or a flaccid condition of the walls favours inversion.

Etiology of Inversion due to Tumours.

2. *Inversion secondary to uterine tumours* is much rarer. Of 400 cases, only forty (ten per cent.) arose in this way (*Crosse*). It has been observed with pediculated fibromata (fig. 227),[1] and will be referred to again when we treat of them (*v.* Chap. XXXVIII.). Brewis[2] has recorded a case of its occurring spontaneously in a uterus from which a polypus had been previously discharged. It is frequent in sarcoma (*v.* Chap. XLIII.), but very rare in carcinoma uteri. Tait[3] found it with villous epithelioma, and Barnes describes a specimen in which both conditions were present, but does not say which was the primary lesion.

SYMPTOMS.

The symptoms produced by inversion at the time of its occurrence, concern the obstetrician rather than the gynecologist. There is the feeling of something giving way in the pelvis, accompanied with pain, hæmorrhage, and sometimes collapse. With complete inversion, there is retention of urine; it often occurs, or at least becomes so marked as to attract the patient's notice, when she has made a straining effort. The cases where the patient says that it first came down several days after labour, are to be explained by supposing that partial inversion occurred after labour but only the final stage attracted attention.

If the uterus be not replaced at the time, the case becomes one of chronic inversion. The symptoms of chronic inversion are—

Hæmorrhage,
Pain in the pelvis of a bearing-down character,
Anæmia and weakness.

Hæmorrhage is the most dangerous symptom. The menstruation is always profuse, as may be easily understood from the fact that the mucous membrane is extended in its area and lies exposed in the cervical canal and vagina. There are also inter-menstrual hæmorrhage, which comes on unprovoked or on straining.

The *bearing-down pain* in the pelvis resembles that felt in prolapsus uteri. It varies indefinitely in intensity; sometimes it is very acute, rarely is it so slight that the patient becomes reconciled to her discomfort and is able for work.

The *anæmia* and *weakness* may be so marked as to cause suspicion of malignant disease.

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[1] Lee records two cases of its occurrence with fibroid tumours—*Amer. Journ. Obstet.* 1888, p. 616.

[2] *Edin. Med. Journ.* July, 1887.

[3] *Brit. Med. Journ.* 1887, I. p. 66.

DIAGNOSIS.

Diagnosis of recent Inversion.

The diagnosis of *recent inversion* is easy. If the placenta has not yet been born, the hands laid on the fundus to expel it by the Credé method find that the rounded fundus is replaced by a cup-shaped hollow. The cervix is sometimes lifted up by the inverted uterus, so as to be "high above the pubes, even near the umbilicus" (*Crosse*). On passing the hand into the vagina to remove the placenta, care is required to recognise what is placenta and what is inverted uterus, and not to increase the inversion in detaching the placenta. If the placenta is already expelled, the hand on the abdomen recognises the same condition; while a large soft body, varying in size according to the extent of the inversion, fills the vagina.

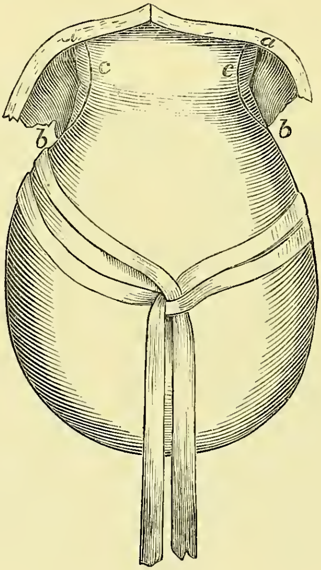

Fig. 229.

Inverted Uterus drawn down by tape-noose; *a c b* line of incision in cervix in Barnes' operation (*Barnes*).

Diagnosis of Chronic Inversion.

Chronic Inversion. Before the Sound and the Bimanual came to the gynecologist's aid in diagnosis, it was impossible to diagnose this condition with certainty. Mistakes were committed by the most eminent surgeons, just because they had not the means of examination which we now possess. Even nowadays mistakes occur through the hasty making of a diagnosis before all the means of examination have been employed. We therefore describe fully the routine examination.

1. Pass the fingers into the vagina; a rounded and firm or flattened and soft tumour, which bleeds easily, is felt in the vaginal cavity. Sweep the fingers round it, and recognise that it is free on all sides except at its upper extremity. Round this extremity is felt the cervix, the lips and fornices being recognised; or the cervix is thinned out to a ring and the fornices obliterated. If the cervical canal be obliterated by adhesions, the finger will not pass farther up; if it be patulous, it will pass for one-and-a-half to two inches and find that the cervical mucous membrane is reflected equally all round on to the neck of the tumour.

2. With one finger in front of the tumour and the other behind it, lift it up towards the abdominal wall which is depressed with the external hand till the fingers in the vagina are in contact with it. The external hand feels, in the place of the fundus uteri, a truncated body with a depression in the centre (see fig. 231).

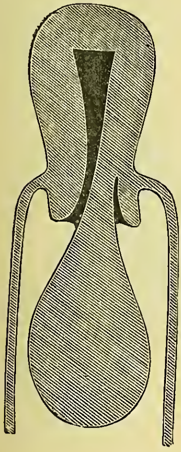

Fig. 230.

Uterine Polypus (after *Thomas*). The uterus in its normal position. Sound passes into uterine cavity.

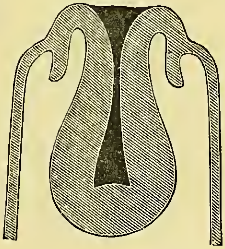

Fig. 231.

Inversion of Uterus (after *Thomas*). A cup-shaped depression is in the place of the uterus. Sound arrested at angle of flexion.

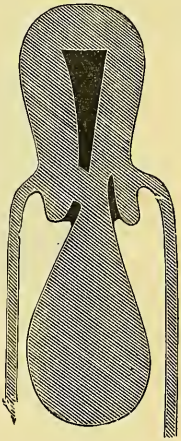

Fig. 232.

Uterine Polypus. Adhesions round pedicle obliterate cervical canal.

3. Now pass one finger into the rectum, which first comes on the body in the vagina: drag this body downwards with the noose represented at fig. 229, as the volsella causes hæmorrhage; the finger in the rectum, reaching the upper border of the body, can thus feel that it ends abruptly and can pass into the cup-shaped end. Now depress the abdominal walls till they reach the finger in the rectum, or pass a sound into the bladder and direct the point of it backwards till it can be touched by the rectal finger.

4. The sound may be used to probe round the neck of the body where

there is not space for the finger to pass upwards. It is most useful, however, in differential diagnosis.

Differential Diagnosis of Inversion from Polypus.

DIFFERENTIAL DIAGNOSIS. Inversion must be differentiated from the following conditions :—

1. Polypus in the vagina, simple or with adherent pedicle;
2. Intra-uterine polypus;
3. Uterine polypus with partial inversion;
4. Prolapsus uteri;
5. Inversion and prolapsus.

1. In a uterine polypus which lies in the vagina, the fundus will be found to lie somewhere else than in the vagina; it may be retroverted and thus escape recognition in the Bimanual; the rectal examination will then discover it. Having found what we suppose to be the fundus, pass the sound along the side of the pedicle; if it is in the uterus, the sound passes more than 2½ inches; if it passes 2½ inches or less, suspect that partial inversion complicates the polypus.

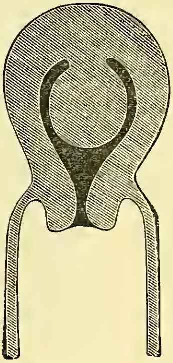

FIG. 233.
POLYPUS STILL INTRA-UTERINE (after *Thomas*).

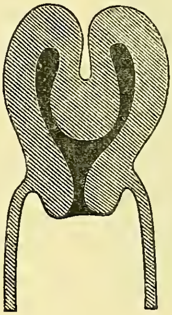

FIG. 234.
PARTIAL INVERSION OF UTERUS (after *Thomas*).

When there are *adhesions round the pedicle obliterating the cervical canal*, a careful Bimanual will reveal the fundus in its normal position and justify us in breaking down the adhesions with the sound so as to effect a passage into the uterine canal (fig. 232).

2. In a uterine polypus which is still *intra-uterine* the differential diagnosis is more difficult. A case has been recorded in which inversion of one horn of the uterus was diagnosed and amputated as a polypus. A careful examination per rectum under chloroform might detect the cup-shaped depression found in partial inversion; the uterine cavity is always enlarged when a polypus is present (fig. 233 and fig. 234).

3. Having satisfied ourselves that there is a polypus, the possibility of there being *partial inversion* of the uterus at its attachment must be

kept in view (fig. 235). A careful rectal examination might reveal a depression on the peritoneal aspect of the uterus. The greater sensitiveness of the uterine mucous membrane also helps us; thus if we apply the écraseur without chloroform—which is not necessary—to remove the polypus and the patient has great pain on our tightening up the wire, we may suspect that the loop has embraced the wall of the uterus.[1]

4. *Uncomplicated prolapsus uteri* would only on a very superficial examination be mistaken for inversion. The obliteration of the fornices, the presence of the os externum at the end of the protruded tumour, and that of the uterus within it—as demonstrated by the sound and examination per rectum—show that it is a case of prolapsus. If, however, the prolapsus be due to a fibroid tumour of the cervix and the os externum be closed by adhesions or distorted, diagnosis is more difficult (*v.* Uterine Polypi).

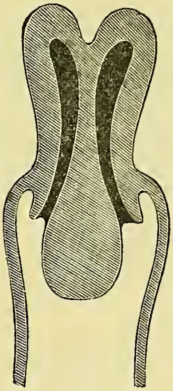

Fig. 235.

Uterine Polypus + partial inversion.

5. *Prolapsus + inversion* is a rare condition. The specimen represented at fig. 227 is quite unique; the apex of the tumour protruding through the vulva consists of a submucous fibroid, the inverted uterus constitutes the next portion, while the base is formed by the inverted vagina.

COURSE AND RESULTS OF CHRONIC INVERSION.

Spontaneous Reinversion.

Spontaneous reinversion and cure has been observed, according to Thomas, in twelve cases.[2] From the rarity of its occurrence, it is to be regarded as a gynecological curiosity rather than a natural termination; the mechanism of its production is not yet known.

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[1] Faucon noted this in one case even though the patient was under an anæsthetic; the inversion was partial and only of one horn, and could not be recognised before the operation—Sur une form particulière d'Inversion polypeuse de l'utérus, etc.—*Archiv. de Toc.*, 1887, p. 1042.

[2] A recent case is recorded by Kemarski—*Centralb. f. Gyn.*, 1889, S. 287.

Toleration of the condition is also rare, though cases are reported in which the uterus has become reconciled to its new position and surroundings and the patient has recovered perfect health.

The greater proportion of unrelieved cases end fatally through anæmia, hæmorrhage, septicæmia, or peritonitis.

PROGNOSIS.

As to the hope of reduction—of sixty-six cases collected by Macdonald, forty-four were successful.

TREATMENT.

Historical. The reposition of the inverted uterus is one of the gynecological triumphs of the last five and twenty years. Up to 1856 when Tyler Smith effected reposition by gradual compression with an air pessary, the only hope of cure was by amputation with the many risks attendant on that operation. About the same time White of Buffalo (1858) independently succeeded in replacing an inversion by pressure with the hand. After these a number of successful cases are recorded, among which the most noteworthy is one of Noeggerath who replaced an inversion of thirteen years' duration.

Various methods of reduction have been recommended by Tyler Smith, White, Emmet, Courty, Noeggerath, Thomas, Matthews Duncan, Barnes, Braxton Hicks, and Tate. It would take too much space to describe each method in detail; the references will enable the student to consult the original articles.

The treatment of inversion is best considered as follows:—

A. Reposition (*a*) with the hand alone or aided by instruments,
(*b*) by continuous slight elastic pressure;
B. Amputation.

A. *Reposition.*

The obstacle to reposition is the resistance of the tissue of the lower segment of the uterus; the principle of treatment is to overcome this by steady pressure.

Suppose that we have a case of inversion, how are we to proceed? The patient is kept perfectly at rest for a few days; injections of very warm water are employed twice or thrice daily; nutritious diet is given, and iron is usually required for anæmia. Ergot is required if there is menorrhagia; should it not be the menstrual period, the best thing to check hæmorrhage is injection of very hot water.

Having thus prepared the patient we proceed to reposition. Are we to employ the more rapid manual method or the slower one with an instrument? If the patient does not object to an operation under chloroform and if we can have assistants to take turns with us in keeping up manual pressure, the former method should certainly be tried first.

Reposition with the hand.

(*a.*) *Reposition with the hand alone or aided by instruments.* For a few days previously, the largest size Barnes bag which the patient can bear is placed in the vagina and distended; this makes space for the operator's hand, and may itself effect the reposition.[1] The patient, under chloroform, is placed in the lithotomy position; pass the right hand into the vagina, and grasp the uterus with the fingers as far into the angle of reflexion as possible (fig. 236). Now press the uterus steadily upwards against the left hand on the abdomen. The fingers may be separated as far as possible so as to open out the cervix.[2]

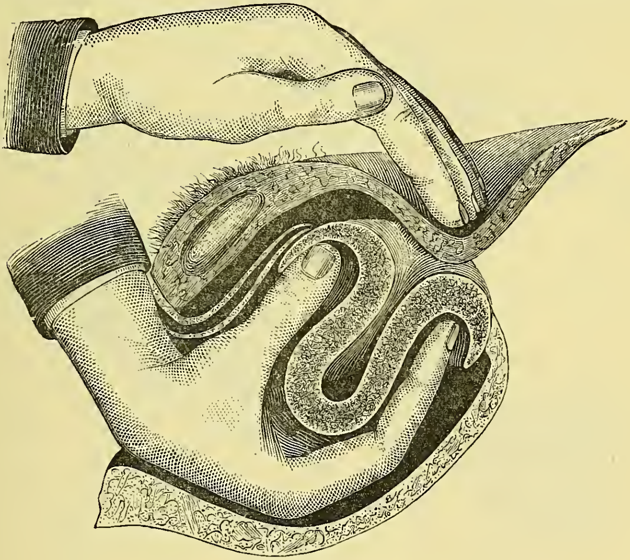

Fig. 236.

Reposition of the Inverted Uterus with the hand alone (after *Emmet*).

Noeggerath.

White.

Atthill.

Sometimes the process of re-inversion is started by dimpling inwards one horn of the uterus, and then forcing the depressed horn onwards as a wedge to open up the ring of the cervix.[3] As the hand cannot keep up steady pressure for any length of time, a cup is set on a curved iron rod with a spiral spring[4] to make the pressure equal. A curved wooden rod, with a large cup at one end and a small one at the other, has also been used to keep up pressure.[1] The end of the instrument is pressed against the operator's chest, and the cup is steadied with the hand in the vagina. It is evident that these instruments require a roomier vagina than when the hand alone is used; and if the cup slips unexpectedly it may rupture the fornix. Counter-pressure is made over the abdomen with the hand, or if the abdominal walls are thin and there is a distinct Thomas. cup on the peritoneal aspect, with a cone of wood,[2] which is used to distend Schroeder. the ring of the cervix; the traction can be taken off the vaginal walls by fixing the cervix with volsellæ.[3] Counter-pressure may be made Courty. per rectum in the following way:—Pass index and middle fingers of right hand into rectum, draw down the uterus with the left hand or the noose (fig. 229) until these fingers get fairly above the cervix so as to press on the margins of the peritoneal depression; grasp uterus now with left hand, turning it so that the fundus is towards the symphysis and the cervix towards the sacrum; finally, make pressure with the index and thumb in the angle of reflexion against the two fingers in the rectum.[4] Tate. The urethra has also been dilated so as to allow one finger to press on the anterior rim of the depression, while the rectal finger presses on the posterior.[5] To weaken the resistance of the cervix, lateral incisions have been made into its substance (*Barnes*, see fig. 229).

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[1] Kroner has collected six cases of inversion (longest of eleven years standing) replaced by this means; the pressure was applied for periods varying from one to eleven days.—*Archiv f. Gyn.*, B. xiv., S. 270.

[2] Emmet—*Op. cit.* p. 418. It is very doubtful whether the constricting cervix has anything to do with preventing reposition, though upward and outward pressure round the neck favours it.

[3] Noeggerath—*Am. Med. Times*, 1862, vol. iv. pp. 230, 235.

[4] White—*Intern. Med. Cong. Trans.*, Philadelphia, 1876. Byrne—*New York Med. Journ.*, Oct. 1878.

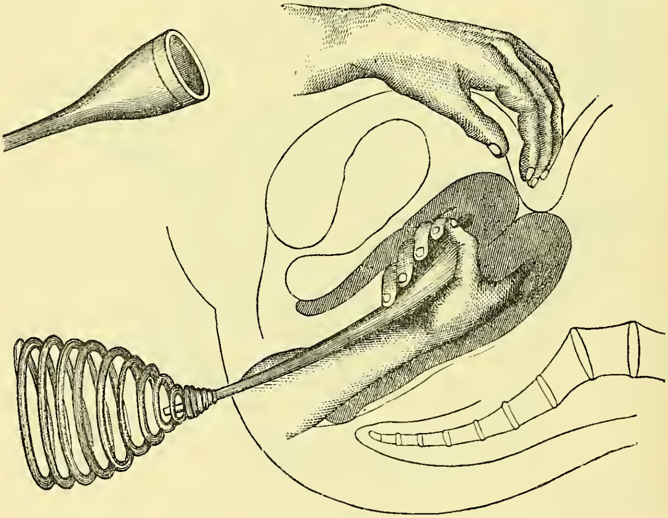

Fig. 237.

White's Repositor, with Elastic Spring placed against the Operator's chest. While the right steadies cup and uterus, counter-pressure is made with the left hand or better by an assistant (*Thomas*).

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[1] Atthill—*Loc. cit.* Braxton Hicks—*Brit. Med. Journ.*, Aug. 1872.

[2] Thomas—*Op. cit.* p. 468.

[3] Schroeder—*Op. cit.*, S. 203. Atthill—*Loc. cit.*

[4] Courty—*Maladies de l'utérus*, 1866.

[5] Tate—*Cincinnati Lancet and Observer*, March 1871.

This manual pressure is, with the help of assistants, to be kept up from half-an-hour to two hours according to the condition of the patient.

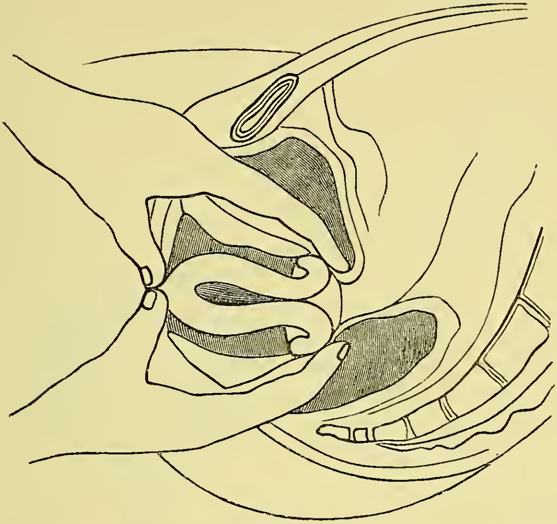

Fig. 238.
Tate's Method of making Counter-pressure with Fingers in Bladder and Rectum (*Mundé*)

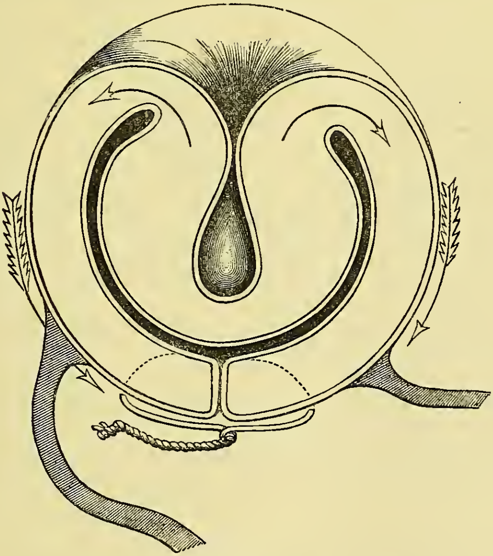

Fig. 239.
Emmet's Method of retaining the partially re-inverted Fundus by closing the os Externum with sutures; the traction, produced in the direction of the arrows, favours re-inversion (*Emmet*).

Emmet.

If not successful in this time, the patient is kept in bed and under the influence of opium while a Barnes bag is placed in the vagina to maintain the uterus as far as it has been replaced. When the uterus has been so far reinverted that the fundus is above the level of the os externum, the lips of the latter may be drawn together with wire sutures (fig. 239).[1]

Abdominal Section for Inversion.

Abdominal section, so as to allow the operator to get at the constricting rim of the cup from its peritoneal side and dilate it with expanding forceps, has been proposed by Thomas. It was successful in the first case; a second proved fatal from peritonitis. It has been tried unsuccessfully by A. R. Simpson, while Malins,[2] and more recently Mundé,[3] succeeded so far in dilating the ring, but failed in pulling up the uterus by the ingenious method of passing a thread through the fundus; Schmalfuss[4] has recently recorded a successful case. Brown[5] succeeded in dilating the ring by getting at it per vaginam through an incision in the inverted fundus; a dilator was introduced and the rim expanded: the incision in the uterus was stitched before the inverted fundus was pushed up.

Reposition by Elastic Pressure.

(*b*) *Reposition by continuous slight elastic pressure.* If manual reposition has failed, we try the more gradual method; in some cases we employ it from the first. Gradual pressure may be produced by an india-rubber bag placed in the vagina and distended with water from a douche-can so that hydrostatic pressure is brought to bear.[6] Thiry[7] has devised an ingenious bag consisting of a double-walled india-rubber capsule, which is slipped over the uterus; when distended with air, it compresses and pushes up the inverted fundus. Pressure by an inflated bag is not so efficient as that produced by a wooden cup set on a stem[8] with a vaginal (or, better still, a vaginal and perineal)[9] curve so that the pressure is made in the axis of the brim. Pressure may also be made by the four elastic bands which pass, two in front and two behind, to a broad abdominal bandage; by the tightening of the front or the back bands, the direction of pressure is altered.

In this method there are two points which require careful attention. (1.) The elastic pressure must always act in the line of the axis of the inverted uterus, and likewise of the axis of the pelvic brim; the cup is apt to slip off the uterus, and the handle of the instrument to alter its direction. *Pressure in a wrong direction is injurious, and may produce sloughing.* To prevent these accidents we pad, with wadding soaked in carbolised oil, all round the neck of the inverted uterus and round the cup of the repositor when *in situ;* we watch the position of the instrument, and remove and re-apply it every day so as to see how it is pressing and whether there is sloughing.

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[1] Emmet—*Op. cit.*, p. 430.

[2] *Lancet*, 1885, II., 401.

[3] *Amer. Journ. Obstet.* 1888, p. 1279.

[4] *Centralb. f. Gyn.* 1886, p. 745.

[5] *New York Med. Journ.*, Nov. 24, 1883.

[6] Runge—*Lancet*, 1887, I., p. 1293. Jaggard records an interesting case of inversion of twenty-one months' standing reduced after thirty-three days' use of the colpeurynter—*Amer. Journ. Obstet.* 1887, p. 130.

[7] *Archiv. de Tocolog.*, 1885, p. 925.

[8] Lawson Tait—*Obst. Journ.* vol. iv., p. 555.

[9] Aveling—*Loc. cit.*, records ten cases of successful reposition with his cup and stem which has a sigmoid curve.

(2.) There must be effective counter-pressure, so as to take the strain off the vaginal walls. This is effected by means of a broad flannel bandage, firmly secured round the loins, under which cotton wool is padded in such a way as to press exactly upon the fundus.

The elastic pressure is kept up from one to three weeks. Cases of reposition at this period, or even after it, are recorded.[1]

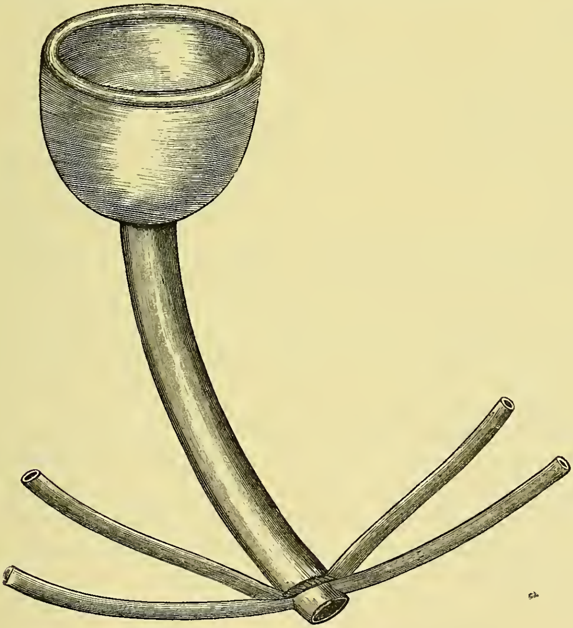

FIG. 240.
CUP WITH STEM AND ELASTIC BANDS which are fixed to an abdominal belt, for gradual reduction of inversion (*Thomas*).

In cases of inversion due to tumour growth, the tumour—if simple—must be removed in the first instance; we then wait to see if the uterus will replace itself, and if it does not we proceed to replace it. If the tumour be malignant, the propriety of amputating the uterus with the tumour must be considered.

B. Amputation.

Amputation of the inverted uterus is justifiable (except in cases of malignant disease) only after all means of reposition have been fairly tried and failed, or when the uterus is extensively ulcerated and gangrenous. The length of duration of the inversion is no argument for amputation; Nœggerath replaced one of thirteen years' standing.

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[1] As by Neugebauer, after three weeks—*Centralb. f. Gyn.* 1887, p. 63.

The morality in amputation is high, 1 in 3 (*Crosse*). The dangers of the operation are—

Hæmorrhage,
Septicæmia,
Peritonitis,
Retraction of the stump into the peritoneal cavity.

Amputation of Inverted Uterus with the knife.

We describe the operation as we have seen A. R. Simpson perform it with success.

The following are the instruments required:—

Vaginal douche,
Elastic ligature,
Sims' speculum,
Spatulæ,
Volsellæ,
Dissecting and artery forceps,
Bistouries,
Scissors,
Long straight fixed needles,
Smaller curved needles and holder,
Silver wire—two thicknesses,
Carbolised silk and catgut.

Place the patient in the lithotomy posture, under chloroform. Keep up irrigation with the douche during the whole operation. Hook back the labia with spatulæ, to be held by the assistants who steady the legs; draw down the perineum with Sims' speculum, to be held by another assistant.

Ascertain before making any traction on the uterus where the natural neck of the inverted portion lies, and pass round it an elastic ligature knotted so as to control hæmorrhage. The natural neck is our guide as to the line of amputation; if we drag more of the uterus down into the constricting loop, the stump is liable to spring back after the amputation has been performed.

Pass three or four wire sutures through the uterus in an antero-posterior direction, about an inch below the constricting ring, as described under the operation for amputation of the cervix (*v.* p. 284); the same figures will show how the sutures are passed in this operation, if we suppose the inner circle (which represents the mucous membrane of the cervical canal in fig. 169) to represent the cross section of the peritoneal pouch. The advantages of passing these sutures before amputating are the following: they are ready *in situ* to control hæmorrhage; they give us a purchase on the stump when the portion in the bite of the forceps is cut away; they are more easily passed at this stage.

The uterus is now amputated about half an inch below these sutures. Bleeding points of any size are ligatured with catgut on the end of the stump. The lips are then brought together with the deep sutures already passed. Kaltenbach ties the lateral sutures over the sides instead of the end of the stump; this constricts the uterine arteries more efficiently. More superficial ones are placed between these to bring the mucous membrane together. To prevent re-inversion of the cervix, it has been proposed to stitch the stump to the adjoining cervical mucous membrane. The india-rubber constrictor is now notched so as to diminish its pressure, and finally cut through. The ligatures are left long enough to be brought out at the vaginal orifice, and a drainage tube is placed in the cervical canal.

The elastic ligature is preferred by a great many operators; when used, we should cut away as much of the tissue below the ligature as possible to minimise the risk of septicæmia from the necrosed tissue. To keep it from slipping, Spencer Wells transfixed the uterus with needles; Courty[1] makes a furrow with the cautery to hold the ligature. Instead of putting the elastic ligature directly on the neck of the tumour, a silk noose may be applied on a stem like that for a wire écraseur and the ends tied to an elastic cord so as to give elastic traction.[2]

Re-inversion of the Stump.

Re-inversion of the stump is a serious accident, as the raw surface now lies in the peritoneal cavity and may be a source of septicæmia; further, it is beyond our control should hæmorrhage occur. In two cases of amputation with the galvano-caustic wire, performed by Spiegelberg,[3] this accident occurred: in these no bad effect followed, because the discharge escaped by the cervical canal; he attributes this happy result to the fact that the stump-surface of the galvano-caustic wire, being a convex cone, became, on re-inversion, a concave cone opening into the cervical canal.

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[1] *Archiv. de Tocolog.*, 1885, p. 922.

[2] Poncet: *Archiv. de Toc.*, 1886, p. 351.

[3] *Archiv f. Gyn.*, Bd. IV., S. 358.

CHAPTER XXXV.

TUMOURS OF THE UTERUS. FIBROID TUMOURS: PATHOLOGY AND ETIOLOGY.

LITERATURE.

Barnes—Diseases of Women, p. 746: London, 1878. *Doran*—On Myoma and Fibromyoma of the Uterus and allied Tumours of the Ovary: Trans. of Lond. Obs. Soc., 1888, p. 410. *Duncan, Matthews*—Hæmorrhage from Fibrous Tumours of the Uterus: Edin. Med. Jour., Jan. and Feb. 1867. *Gusserow*—Die Neubildungen des Uterus: Deutsche Chirurgie, Stuttgart, 1885. *Johnston*—A Review of some collected Cases of Fibromata of the Cervix Uteri: Am. Journ. of Obstet., Nov. and Dec. 1885. *Kleinwächter*—Zur Entwickelung der Myome des Uterus: Zeitsch. f. Geb. und Gyn., Bd. IX. S. 68. *Klob*—Pathologische Anatomie der weiblichen Sexualorgane, S. 149: Wien, 1864. *Lee*—Tumours of the Uterus: London, 1847. *M'Clintock*—Diseases of Women: Dublin, 1863. *Reamy*—Case of Fibroid Polypus of the Uterus, with remarks on some points in Etiology (with Discussion): Amer. Jour. Gyn., 1886, pp. 813 and 859. *Routh*—Fibrous Tumours of the Womb: London, 1864. *Schorler*—Ueber Fibromyome des Uterus: Zeitsch. f. Geb. und Gyn., Bd. XI. S. 139. *Schroeder*—Krankheiten der weiblichen Geschlechtsorgane, S. 218: Leipzig, 1886. *Simpson, Sir J. Y.*—Diseases of Women, p. 659: Edin. 1872. *Thomas*—Diseases of Women, p. 519: Philadelphia, 1880. *Winckel*—Ueber Myome des Uterus, etc.: Volkmann's Sammlung klin. Vorträge, No. 98, 1876. *Wyder*—Die Mucosa uteri bei Myomen: Arch. f. Gyn., Bd. XXIX. S. 1. See also Index of Recent Gynecological Literature in the Appendix.

Introductory.

Of tumours of the uterus, the most important are Fibroids and Cancer, less important Adenoma, Sarcoma, and Papilloma; and in the chapters that follow we shall have to consider Fibroids and Cancer at some length, the others briefly. The term "polypus" is so convenient clinically that we retain it, but we must remember that it involves cross-classification, including one variety of fibroid tumour—the fibrous polypus—while the mucous polypus is a pediculated adenoma. Adenoma of the uterine mucous membrane has only of recent years been receiving attention; we shall refer to it under carcinoma, as its chief importance is in connection with the early stages of that affection.

Fibroid tumour is considered first, as in frequency it comes before cancer, although in seriousness the latter is by far the more important. It presents a remarkable contrast with cancer in every respect: it shows itself early in life, while cancer is late; it occurs among the well-to-do, while cancer makes its ravages among the poor and badly fed; it is the tumour of the sterile, while cancer is that of the parous; it very rarely affects life, while the fate of the cancer-patient is almost sealed.

Synonyms.—Myoma or Fibro-myoma Uteri; Fibrous Tumour; Tumeur fibreuse; Hystérome.

Nomenclature.

As this tumour is composed of both the connective tissue and muscular elements of the wall of the uterus, it is at once a fibroma and a myoma; the most correct term is therefore *fibro-myoma*. In the majority of cases, however, the fibrous tissue preponderates, so that the tumour resembles a fibroma; the English term fibroid (a term derived from the root of fibroma and εἶδος = like a fibrous tumour) is therefore not inappropriate, and is also more convenient.

PATHOLOGY.

Under this head we shall describe their
Situation;
Structure—naked eye and microscopic;
Mode of growth, varieties;
Changes in uterus;
Degenerative changes.

SITUATION.

They occur much more frequently in the body of the uterus than in the cervix; of seventy-four cases of fibroid tumours recorded by Lee, only four were in the cervix. In the body of the uterus the most common seat is *the posterior wall;* they occur less frequently in the anterior wall, and very rarely at the sides of the uterus. The soft, truly muscular form is most commonly situated at the fundus.

STRUCTURE.

Naked-eye Structure of a Fibroid Tumour.

They are composed of the same elements as the muscular wall of the uterus, viz., of non-striped muscular fibre and fibrous tissue. These are both present in every case, as the name for these tumours (fibro-myoma) implies. The proportion of these constituents, however, varies; in some rare cases the muscular tissue preponderates, producing a true *myoma* which is not circumscribed and grows rapidly; more usually there is excess of fibrous tissue producing a *fibro-myoma*, which is distinctly marked off from the wall of the uterus and grows slowly. The naked-eye characters of the myoma are those of a pale, flesh-coloured tumour having a soft consistence, passing gradually into the surrounding uterine wall, and usually single. The fibro-myoma, by far the most frequent form,[1] is of firm consistence which makes it feel like a foreign body in the softer muscular wall; it is of a pale colour, resembling fibrous tissue; it cuts like cartilage, the cut surface having a glistening satin-like appearance and being often uneven through the firmer fibrous tissue forcing out the softer parts between; the bundles of fibrous tissue have a concentric arrangement round one or more centres (fig. 241).

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[1] Doran (*loc. cit.*) thinks the frequency of fibro-myoma as compared with myoma is over-estimated. Young fibroids are "pure myomata with or without connective tissue."

Capsule of a Fibroid.

The tumour is surrounded by loose fibrous tissue, which with the immediately adjoining muscular layer constitutes the so-called *capsule;* it has a broad connection at one point with the muscular tissues of the wall, or becoming entirely detached from it lies free in its capsule. This looseness of the tissue round the tumour is important in relation to its removal by the process described as *enucleation.* Few blood-vessels penetrate into the substance of the tumour, although the tissue immediately round it is very vascular and often contains enlarged veins which resemble the venous sinuses of the pregnant uterus (fig. 251); nutrition is apparently effected by transudation from the capsule. In some rare cases, however, these tumours possess a cavernous structure consisting of dilated blood-vessels. Virchow has described this form as "Myoma teleangiectodes seu cavernosum;" cases are recorded by Leopold and Schroeder.

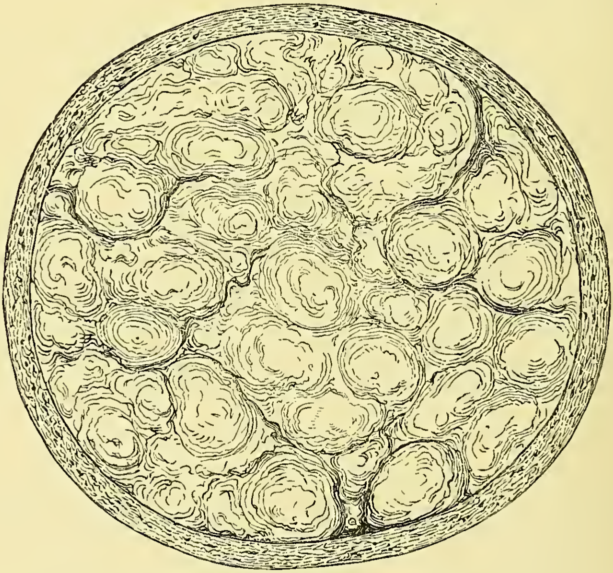

Fig. 241.

Section of a large Fibroid Tumour, with the Fibres arranged round several centres (*Sir J. Y. Simpson*).

Microscopic Examination.

On microscopic examination, the myomatous form has the appearance of muscular fibre of the uterus—the muscle-cells being, according to Doran,[1] larger than those of the uterus in which it grows. The fibromatous form (common fibroid tumour) has the appearance shown at fig. 242, in which the wavy bundles of fibrous tissue are well seen. Sometimes the bundles of fibrous tissue are separated by spaces (fig. 243), which Klebs considers to be lymphatic spaces. Nerves have been traced into the substance of these tumours by Lorey; but, as an interesting case recorded by Freund shows, they are not sensitive:—a submucous fibroid was extruded beyond the vulva; the lower third, which protruded beyond its capsule of mucous membrane, was not sensitive to the prick of a needle; the upper two-thirds, from their being still covered by *mucous membrane*, were very sensitive. The mucous membrane covering them is ciliated,[1] like that of the uterus generally; though when it has been exposed for some time (*e.g.* when a fibrous polypus comes to be in the vagina) it becomes squamous.[2]

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[1] *Loc. cit.* He figures a section of a myoma from a pregnant uterus which shows this well, the muscle-cells being still larger than the hypertrophied ones of the uterus.

Lymphatic Bundles.

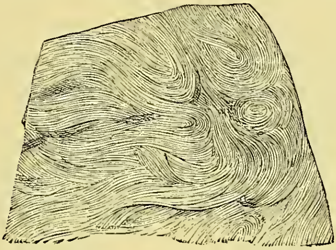

FIG. 242.

SECTION OF FIBROID TUMOUR, showing wavy bundles of fibrous tissue ½ (*Gusserow*).

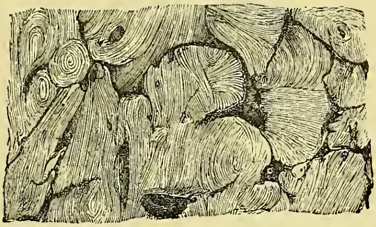

FIG. 243.

SECTION OF FIBROID TUMOUR, showing spaces between bundles of fibrous tissue ½ (*Gusserow*).

MODE OF GROWTH, VARIETIES.

Rate of Growth.

Fibroid tumours grow slowly; the more they consist of fibrous tissue, the slower the growth. During pregnancy, they increase more rapidly in size; in the puerperium, they may become smaller again and even cease to be recognisable. It is difficult to determine the rapidity of growth. It is unsatisfactory to estimate it from the appearance of symptoms and compare the time elapsed with the present size of the

[1] Gervis—*Brit. Med. Journ.*, 1886, II., p. 871.

[2] Reamy—*Loc. cit.*, p. 817.

tumour; the only reliable data are got from the examination of the tumour from time to time. Schorler has reported on 18 cases observed by Schroeder and comes to this conclusion: A tumour will not grow to be for the first time recognisable in less than three months' time and in a year may not be much larger; in five years it may grow to the size of a man's fist, and in thirteen to the size of the head. It is evident that these statements only give a general idea of the rapidity of growth, to which there are great exceptions.

After the menopause, their growth is, as a rule, arrested; the menopause is generally late in cases of Fibroids.

Mode of Growth.

All fibroid tumours are, in the beginning, interstitial or intra-mural. As they increase in size they expand in the substance of the wall or towards one of the free surfaces (peritoneal or mucous), thus becoming subperitoneal or submucous. Hence three varieties are recognised—*interstitial*, *subperitoneal*, and *submucous*. It is evident that these terms are relative, as it is difficult to say when an interstitial fibroid becomes submucous. Gusserow limits the term "submucous" to *pediculated* submucous, and "subperitoneal" to *pediculated* subperitoneal fibroids. A submucous tumour, however, often gives rise to the clinical signs diagnostic of the submucous variety long before it becomes pediculated. Each variety requires short description. For the sake of convenience, we describe first the fibroid tumours found in the body of the uterus; the comparatively rare fibroid tumours of the cervix are best noticed separately (p. 412).

Varieties of Fibroid Tumours.

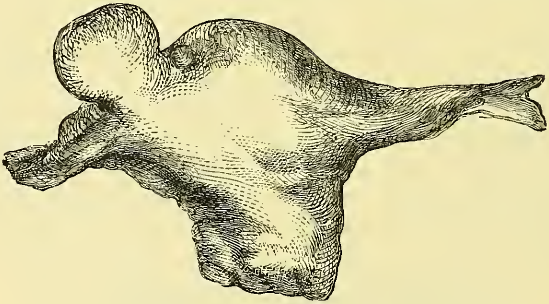

FIG. 244.
PEDICULATED SUBPERITONEAL FIBROID TUMOUR (*Sir J. Y. Simpson*).

Subperitoneal Fibroids.

A. The Subperitoneal grow outwards into the peritoneal cavity. The thickness of the pedicle varies (compare fig. 244 with fig. 245); its length determines the mobility of the tumour. When the tumour attains a certain size, one of two things happens. (1.) It may grow up into the abdomen and expanding there draw the uterus forcibly upwards, producing by this traction elongation of the cavity (fig. 245) with thin-

Growth into Abdomen.

ning of the walls. An interesting case is recorded by Times[1] in which the cavity of the body of the uterus was elongated to six inches; the cervical canal, extending only one inch inwards from the os externum, ended blindly at a point two inches distant from the beginning of the cavity of the body; the intervening portion was obliterated so as to form a solid muscular cord. Virchow says that the body may even be torn from the cervix by forcible traction. (2.) The tumour, growing from the first within the pelvis, may through pressure produce the symptoms of incarceration; or, having a long pedicle, may fall down from the abdomen into the pelvis and produce similar symptoms. The point of origin of the tumour and the length of the pedicle determine whether these symptoms can be relieved by pushing the tumour out of the pelvis. Twisting of the pedicle occurs less frequently in fibroid than

Incarceration in Pelvis.

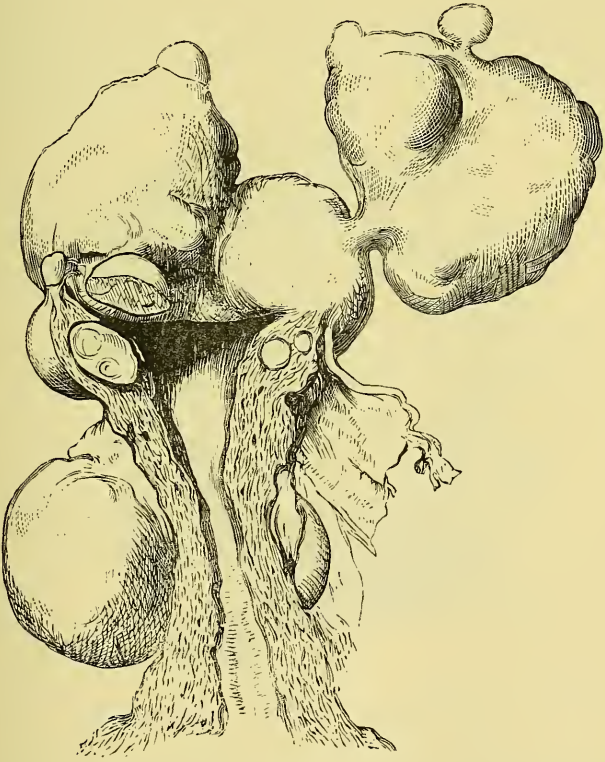

FIG. 245.

UTERUS WITH ELONGATED CAVITY DUE TO THE PRESENCE OF SEVERAL FIBROID TUMOURS (*Sir J. Y. Simpson*).

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[1] *Lond. Obst. Trans.*, vol. ii., p. 34.

in ovarian tumours; when it occurs, it leads to œdema or gangrene. Schroeder[1] mentions a case where, on operating, he found the tumour distended with blood from partial twisting of the pedicle. Gangrene of the tumour, leading to a fatal peritonitis, was observed by Cappie;[2] the pedicle was twisted round its axis one and a half times. Adhesions form with other organs, as occurs with all abdominal tumours; these may become new sources of nutrition. Sometimes they lead to detachment of the tumour from the uterus: the tumour is anchored, as it were, to the abdominal walls; and, when the uterus from pregnancy or other causes becomes displaced, the pedicle gives way. Turner[3] reports a case in which a small calcareous fibroid was found free in the pouch of Douglas; a second was attached to the posterior wall of the bladder and to the pelvis; a third was bound down to the bladder and the pelvic wall by adhesions, but still retained its connection with the uterus by a thin pedicle. Adhesions to the intestines have produced symptoms of intestinal obstruction.[4] Hernial protrusion of the abdominal walls has been described by Düll:[5] he reports two cases of this very rare occurrence; in one case, the skin covering the hernial sac became gangrenous, so that the tumour lay exposed.

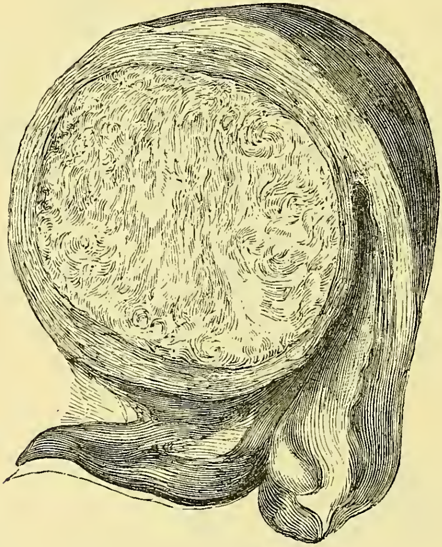

FIG. 246.
INTERSTITIAL FIBROID TUMOUR (*Sir J. Y. Simpson*).

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[1] *Op. cit.*, S. 230. [2] *Obstet. Journ*, ii., p. 303. [3] *Edin. Med. Journ.*, 1861, p. 698.

[4] Eade—*Lancet*, Dec. 21, 1872.

[5] Cited by Schroeder, *op. cit.*, S. 233. Lawson Tait mentions the same condition—*Brit. Med. Journ.*, 1888, I., p. 861.

Interstitial Fibroids.

B. The Interstitial remain in the substance of the uterine wall, and do not become pediculated. The appearance of such a tumour is well seen at fig. 246. Usually there are many such tumours present (fig. 245); Schultze counted as many as fifty in one uterus, and Thomas describes the uterus of a negress containing thirty-five.

Submucous Fibroids.

C. The Submucous are the most important clinically. They lie immediately underneath the uterine mucous membrane, and project into the cavity of the uterus (fig. 247). They are attached along a broad base, or by a pedicle; when they hang free, they are known as fibrous polypi—the most frequent form of uterine polypi (*v.* Chap. XXXIX.). When a fibroid tumour projects into the uterine cavity, it acts as a foreign body and produces uterine contractions. These lead, in some instances, to *pedunculation* of the tumour and even to its extrusion from the uterine cavity; in such a case, it hangs as a polypus in the vagina. In other rare cases, the capsule ruptures and the liberated tumour is expelled in shreds—*spontaneous enucleation.*

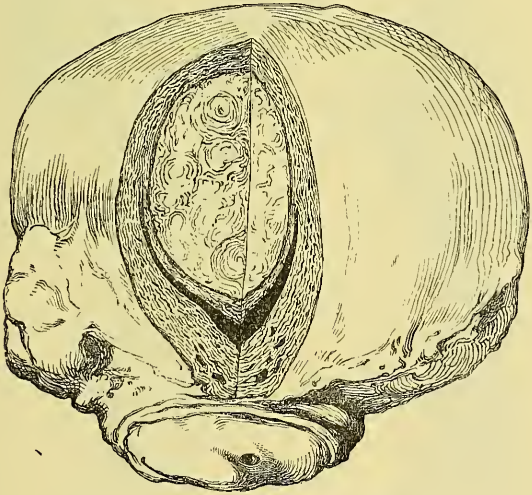

FIG. 247.

SUBMUCOUS FIBROID TUMOUR PROJECTING INTO UTERINE CAVITY (*Sir J. Y. Simpson*).

Changes in Uterus.

The muscular wall hypertrophies, more especially when the tumour is submucous or interstitial. A small fibroid lying in the lower segment of the uterus has caused the whole organ to hypertrophy to the size of a child's head.[1] In submucous fibroids, the *mucous membrane* is also hypertrophied. According to Wyder,[2] the increase in thickness is limited to the portion over the tumour and is due to a hypertrophy affecting in some cases the glands and in others the connective tissue. The mucous membrane may ulcerate leading to enucleation of the tumour.

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[1] Tillaux—*Gaz. des Hôp.*, 1867, No. 144.

[2] *Archiv f. Gyn.*, Bd. xiii. S. 35.

In a more recent paper[1] he gives a very full account of the changes in the mucous membrane which he has examined carefully in twenty cases of uteri removed in Gusserow's Clinique in Berlin. His object was to study it specially with a view to the cause of menorrhagia which is the important symptom of fibroids. From a comparison of the mucous membrane in subperitoneal as compared with interstitial he comes to the conclusion that the thicker the muscular capsule is the less likely is the tumour to affect the circulation in the mucous membrane. The

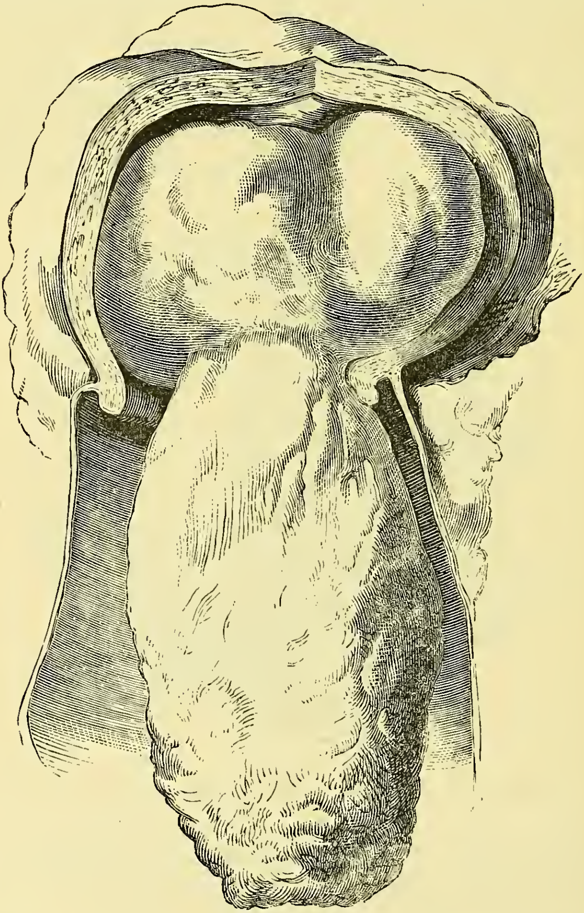

FIG. 248.
PEDICULATED SUBMUCOUS FIBROID IN PROCESS OF EXTRUSION (*Sir J. Y. Simpson*).

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[1] *Loc. cit.* S. 34, 38.

uterine glands in this case are hypertrophied, but the interglandular tissue little or not at all affected; while the nearer the tumour comes to the uterine cavity, the more does the interglandular connective tissue become affected, and this sometimes at the expense of the glands which atrophy. The bearing of this on bleeding is that it is the affection of the interglandular tissue, causing compression of the veins, which leads to congestion and bleeding.

Changes in the position of the uterus have been already referred to; when subperitoneal fibroids rise up into the abdomen, it is sometimes drawn forcibly upwards by them and may be twisted on itself.[1] At other times the weight of a subperitoneal or interstitial tumour leads to prolapsus uteri. Inversion of the uterus is also occasioned by submucous fibroids when these are situated near the fundus and when their pedicle does not admit of their extrusion as polypi.[2]

DEGENERATIVE CHANGES.

These are the following:—Softening, Induration, Calcification, Suppuration.

Softening.

The softening may be due to œdema, to fatty degeneration, or to myxomatous degeneration. The occurrence of œdema is unquestioned, and many cases of sudden increase in the size of fibroid tumours may be thus explained. From analogy with the changes affecting muscular fibre in the puerperal uterus, we should expect fatty degeneration to occur; there is, however, only a small quantity of muscular tissue present in these tumours. There are only two cases[3] recorded in which the existence of fatty degeneration has been demonstrated by microscopic examination, although many cases are reported in which this is supposed to have occurred. Myxomatous degeneration, resulting in the formation of spaces containing mucus between the layers of the tumour, sometimes occurs.

Induration.

Induration, with atrophy or shrinking of the tumour, occurs in some cases after the menopause; the muscular tissue fattily degenerates and disappears, the fibrous tissue contracts.[4] An infarction has also been found.[5]

Calcification.

When calcification occurs, lime salts (chiefly phosphates) are deposited in the fibrous tissue and produce the so-called womb-stones.[6] This deposit usually commences in the centre of the tumour and extends outwards, more rarely in the external layers so as to form a shell round the tumour. Sometimes it is so extensive that the tumour can be cut with the saw, and the cut surface polished; more usually it is incomplete, and forms a coral-like skeleton. Calcification of portions of the tumour is often accompanied with suppuration in others, probably from interference with nutrition.

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[1] As in the case reported by Küster—*Beiträge zur Geb. u. Gyn.* 1872, i., S. 7; the uterus was twisted two and a half times, so that the broad ligaments formed a spiral. Skutsch records another case operated on by Schultze in which the uterus was twisted half round—*Centralb. f. Gyn.* 1887, S. p. 52.

[2] Kötschau records a case of partial inversion, with what he calls "eversion of the uterine mucous membrane," *i.e.* its being pushed downwards without the tumours becoming pediculated—*Centralb. f. Gyn.* 1887, S. 757.

[3] Gusserow—*Loc. cit.*, S. 32. The cases are reported by Freund and Martin.

[4] Sir J. Y. Simpson—*Obst. Mem.*, p. 115.

[5] By v. Ott. The patient had felt pain over it, ascribed to a local peritonitis—*Centralb. f. Gyn.* XII. S. 274.

[6] See a recent case by Bach—*Amer. Journ. Obstet.* 1886, p. 293.

Suppuration.

Suppuration occurs frequently in submucous fibroids, as the result of injury from operative interference or from constriction of the pedicle during the process of expulsion. It has also been observed as a rare occurrence in subperitoneal fibroids, accompanying calcification or from torsion of the pedicle. In such a case, the tumour either finds its way through the abdominal walls or fatal peritonitis follows.

Carcinomatous Degeneration.

Whether *carcinomatous* degeneration specially affects fibroid tumours, is a disputed point. We occasionally find carcinomatous degeneration in a uterus where a fibroid tumour is also present (fig. 280) or from which a polypus has on a former occasion been removed. Whether this is merely a coincidence, or whether there is a liability that the non-malignant tumour may become the seat of malignant disease, is not settled. The practical importance of this question is evident.

As to the frequency of these various changes, Martin[1] gives us the following interesting statistics of his own cases. Of 205 fibroids he found slight retrogressive changes in 70, fatty degeneration in 3, suppuration in 10, œdematous swelling in 11, cystic degeneration in 8, blood-cavities in 3, sarcomatous degeneration in 6, but never carcinoma.

FIBROID TUMOURS OF THE CERVIX.

The occurrence of fibroid tumours in the cervix is rare; but, when they are present, they often give rise to difficulty in diagnosis on account of the distortion which they produce. They spring from either wall, and grow outwards towards the peritoneal cavity or downwards into the cellular tissue beside the vagina. When subserous, they easily produce symptoms of incarceration, as, from their low position, they are liable to become wedged in the pelvis. When submucous, they produce elongation of one lip and may form a polypoidal tumour in the vagina (fig. 249); the accompanying distortion of the os externum leads to difficulty in diagnosis. Cases in which a large tumour bulges through the ostium vaginæ have been mistaken for inversion and prolapsus. Sometimes prolapsus is due to the weight of the tumour and disappears after its removal.[2] The interstitial form is easily mistaken for inversion when the os is converted into a transverse cleft which escapes observation and the unaffected lip is thinned out to a mere band.

Johnston reports on ninety-six cases of fibroid tumour of the cervix, dealing especially with their effect on pregnancy and labour. He finds that abortion is more frequent with fibroid tumours in the body, premature labour with those in the cervix; he affirms that during pregnancy or labour one-third of the mothers and more than one-half of the children die so that, where the tumour cannot be removed, celibacy is to be recommended.

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[1] Ueber Myome: *Archiv f. Gyn.* Bd. XXXII. S. 470.

[2] Barnes—*Obst. Trans.*, III., p. 211.

ETIOLOGY.

Gusserow, to whose exhaustive article—Die Neubildungen des Uterus—in Billroth's Handbuch we are greatly indebted in this Chapter, says in regard to etiology, "Ueber die Ursachen der Uterusmyome wissen wir so wenig, wie über die Ursachen der meisten pathologischen Neubildungen, nämlich *Nichts*" (of the causes of fibroid tumours we know as little as of the causes of most pathological new-formations, that is *nothing*). Virchow and Winckel have both made elaborate attempts to assign a cause to the development of fibroid tumours. The number and variety of causes adduced by these observers only show how far we are from the knowledge of the real cause; with such a variety of causes, the difficulty would not be to explain why they are present in some but why they are not present in every case. The development of the true *myoma* has been recently studied by Kleinwächter. He examined uteri with very small myomata and found that there was a small isthmus of muscular fibre uniting the myomatous mass, lying in its connective tissue capsule, with the muscular tissue around. This isthmus some-

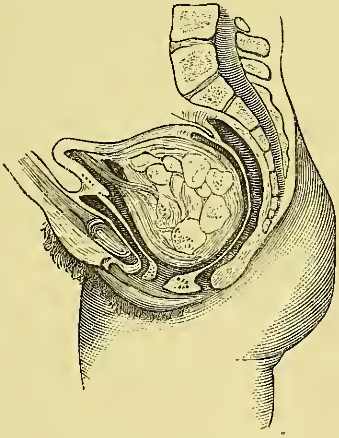

Fig. 249.

Cervical Fibrous Polypus springing by a pedicle from the region of the os internum, and pushing itself under the whole mucous membrane of the cervical canal; so that its insertion is partly continuous with the tissue of the uterus, partly truly submucous. Between these a cavity has formed through tearing of the mucous membrane, so that the tumour has apparently two pedicles (*Schroeder*).

TABLE AND DIAGRAM SHOWING FREQUENCY OF FIBROID TUMOURS ACCORDING TO AGE OF PATIENT.

NUMBER OF CASES.

Out of 919 cases

15 were below 20 years.
156 ,, between 20 and 30 years.
357 ,, ,, 30 ,, 40 ,,
338 ,, ,, 40 ,, 50 ,,
36 ,, ,, 50 ,, 60 ,,
12 ,, ,, 60 ,, 70 ,,
5 ,, above 70 ,,
(*Gusserow*).

PERCENTAGE PROPORTION.

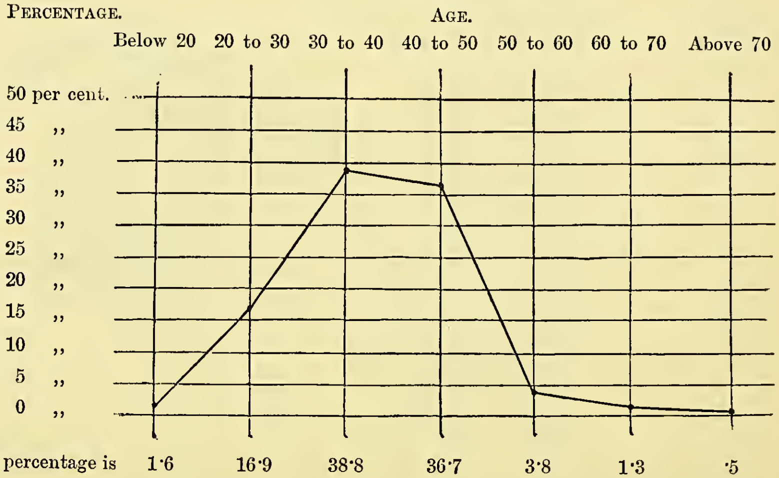

FIG. 250.

times bifurcates and resembles in form an obliterated blood-vessel (capillary). He also saw some capillaries surrounded with round cells and forms transitional to muscular fibres. Hence he concludes that the true myoma is due to a degeneration of a blood-vessel with its branches. From finding micrococci in them, Galippe and Landouzy[1] have suggested that they are due to the irritation of a parasite.

Olshausen[2] has found pain (sensitiveness to pressure and dysmenorrhœa) and menorrhagia complained of before any tumour could be detected by palpation, and thinks this points to congestion of the uterus as being an early clinical symptom in some cases of myoma.

Fibroids are without doubt the most frequent new-formation in the uterus. Klob says that they are present in 50 p.c of women who die over fifty years of age; and Bayle, in 20 p.c. of those who die over thirty-five years; both of these estimates are probably beyond the mark.

Development of Fibroids according to age.

Their appearing is in some way related to the development of the sexual apparatus. Thus, there are no well-authenticated cases of their arising before puberty[3] or after the menopause. The majority of patients are between the ages of thirty and forty when they first seek medical advice, as it is evident from the accompanying table based on statistics collected by Gusserow (fig. 250). Schroeder says that of 196 patients, who during three years of his private practice consulted him for fibroid tumours, 104 were between forty and fifty, and 62 between thirty and forty.

Sexual activity predisposes to their development, as they are more frequent in married than in unmarried women. Of 1876 cases from various authorities collected by Reamy,[4] we find that 1422 or 75$_{\circ}/^{\circ}$ of persons with fibroid tumours seeking advice were married; the larger number of married compared with unmarried persons must be borne in mind in judging of such figures. It is important to note this as it was formerly supposed that single life favoured their development. As the presence of a fibroid tumour interferes with conception, we often find sterility present.

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[1] *Brit. Med. Journ.* 1887, I. p. 799.

[2] Notizen ueber das klinische Anfangsstadium der Myome: *Archiv f. Gynäk.* XXVIII. S. 494.

[3] Tillaux reports a case of a fibroid tumour of the cervix in a girl of nineteen which had caused symptoms for six years.—*Annales de Gyn.* XXVI., p. 241.

[4] *Loc. cit.* p. 818.

CHAPTER XXXVI.

FIBROID TUMOURS OF THE UTERUS: SYMPTOMS; DIAGNOSIS; PROGNOSIS.

LITERATURE.

See Literature of Chaps. XXXV. and XXXVII.

Like other pathological conditions of the uterus, fibroid tumours sometimes produce no symptoms and their presence is discovered accidentally or on *post-mortem* examination. This absence of symptoms is more likely to occur should the tumour be small, or should there be no sexual activity as in unmarried women. In the latter case, although symptoms appear only when the patient enters married life, the tumour may have been already a long time present. Subperitoneal tumours, even when large, may only produce discomfort from undue abdominal distention.

The symptoms usually present may be tabulated as follows:—

1. Menorrhagia, irregular hæmorrhages;
2. Painful menstruation;
3. Pelvic sensations due to size and weight of tumour, peritonitic pain;
4. Symptoms of pressure on bladder and rectum,
   blood-vessels and nerves,
   ureters;
5. Sterility and abortion.

Hæmorrhage in Fibroids.

1. *Hæmorrhage* is the most characteristic symptom in submucous fibroids, and appears first as a *gradual increase* of the normal menstrual flow; it never begins with a sudden flooding as in carcinoma uteri. In *menorrhagia*, the hæmorrhage comes from the hypertrophied mucous membrane of the uterine cavity generally; it does not come from the mucous membrane covering the surface of the tumour which is frequently thinned and atrophied, nor from the substance of the tumour itself which as we have seen is sparingly vascular. When, however, the submucous fibroid projects as a polypus, passive congestion and hæmorrhage from the mucous membrane covering it may be occasioned by the constriction of its pedicle. *Irregular hæmorrhages* arise from ulceration of the mucous membrane covering the tumour, or rupture of the dilated

veins in its capsule. Fig. 251 shows a case[1] in which, through the rupture of a uterine sinus in the lower part of the tumour, a sudden and fatal hæmorrhage occurred. In subperitoneal fibroids menstruation is not increased, and in certain rare cases is diminished.

Pain in Fibroids.

2. *Pain* accompanies *menstruation*. In the submucous variety there is often characteristic uterine *dysmenorrhœa*, in which the pain resembles labour pains. The congestion causes the polypus to swell and this produces uterine contractions (*v.* Uterine Polypi). In interstitial and even in subserous fibroids, there is often pain at the menstrual period which

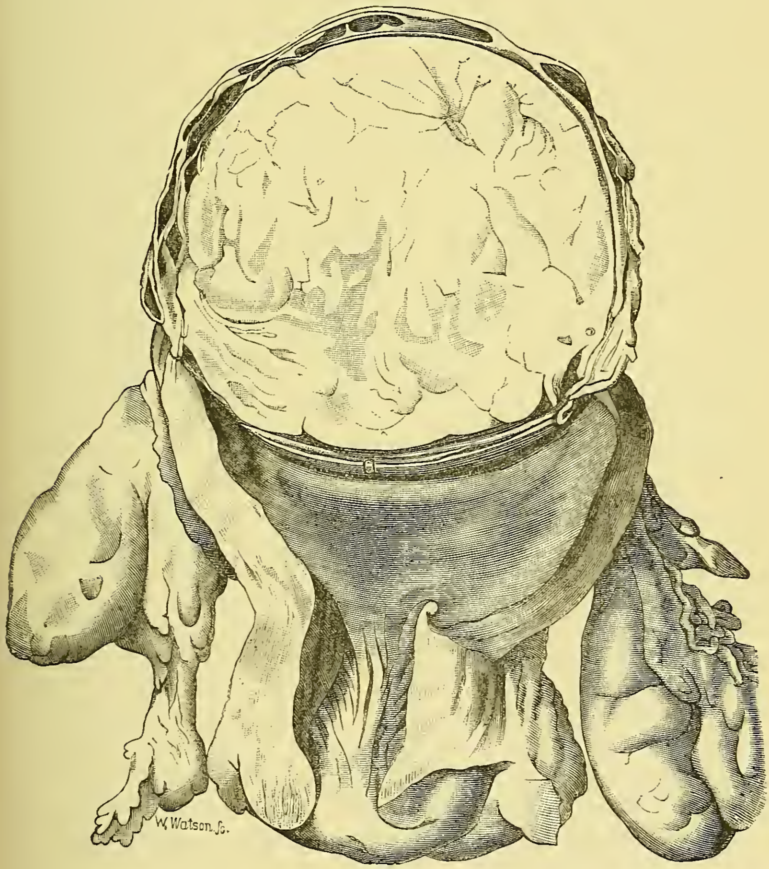

Fig. 251.

Uterus containing Fibroid Tumour, from a case which terminated fatally through hæmorrhage. Note the large venous sinuses in the capsule, one of which ruptured at the point *a* (*Matthews Duncan*).

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[1] Reported by Matthews Duncan—*Edin. Med. Jour.*, 1867, p. 634. He also refers to a case of Cruveilhier's in which death was occasioned in the same way.

cannot be thus explained. In subserous fibroids with a pedicle containing large vessels, as well as in interstitial, Gusserow ascribes the pain to the distention of the tumour with blood. This pain is of a stretching or dragging nature, and is quite different from the pain of uterine contractions.

Weight Symptoms in Fibroids.

3. *Increased weight* of the uterus occasions *sensations* of discomfort, which are described as "fulness or weight in the pelvis," "a sensation of dragging," "bearing-down pain." When the tumour is so large that it fills the pelvis and becomes wedged in it, intense pain is produced; this is either always present, or recurs only at the menstrual periods when the tumour is distended by blood. As in carcinoma uteri, peritonitic pains—indicated by local tenderness and reflex contraction of abdominal muscles—may arise at any time from secondary chronic peritonitis. Neuralgic pain is sometimes present locally (see below), but may be also through the whole body.

Pressure Symptoms in Fibroids.

4. Frequency of micturition, due to *pressure on the bladder*, is the most common pressure symptom. *Pressure on the urethra* produces difficulty of micturition and even retention; with some patients, this recurs regularly at the menstrual period. Even very small fibroids, when they are situated in the anterior uterine wall, may press *on the neck of the bladder* and produce symptoms of cystitis. *Pressure on the rectum* by fibroids in the posterior wall occasions constipation or, more rarely, mucous diarrhœa. Incarcerated fibroids have produced complete obstruction, and led to a fatal result[1] or furnished an indication for colotomy. Intestinal obstruction has also resulted from adhesions between the tumour and the small intestine.[2] *Pressure on the veins* produces hæmorrhoids and varicose veins in the legs. Interesting cases of neuralgia due to pressure on *pelvic nerves* have been recorded. In these cases the neuralgia entirely disappeared as soon as the tumour was lifted up and supported by a pessary.[3] Compression of the *ureters*, with consequent dilatation and hydronephrosis, occurs less frequently in fibroid tumours than in carcinoma. The reason for this is evident; in carcinoma the compression is due to infiltration of the tissue round the ureter, which from the anatomical relation of the ureters to the cervix easily occurs; fibroid tumours in their growth simply press against the ureters, and may push them aside. Several cases of single and double hydronephrosis and of death from uræmia[4] have been recorded. Bright's disease has developed secondarily.[5] In fibroid tumours where pressure symptoms are present, we should always examine the urine.

Sterility in Fibroids.

5. *Sterility* is frequent. Of 149 cases of married women collected by Schroeder, 33 per cent. were sterile and the average number of children

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[1] Holdhouse—*Lond. Path. Soc. Trans.*, III. 371.

[2] Eade—*Lancet*, Dec. 21, 1872.

[3] Kidd—*Dub. Quart. Journ.*, 1872. Jude Hüe—*Annales de Gyn.*, IV., p. 239.

[4] Gusserow quotes cases from Jude Hüe, Murphy, Hanot—*Neubildungen*, etc., S. 52.

[5] Hubert—*Bul. de la Soc. Anatom.*, 1873, p. 870.

to each mother was about three. When conception occurs, fibroid tumour may lead to abortion or complicate labour.

PROGRESS AND RESULTS.

A *relative cure* usually takes place at the menopause, when the tumour ceases to grow. In the case of subserous tumours, this may happen even before that time.

Spontaneous disappearance of Fibroids.

Spontaneous disappearance of the tumour has been observed in certain cases, although nothing definite is known as to the means by which it is effected. After sifting the reported cases, Gusserow's conclusion is that there are thirty cases in which this undoubtedly occurred.[1] Out of these thirty, thirteen were associated with the puerperium and the rest chiefly with the menopause. We might account for their disappearance during the puerperium by a process analogous to involution. Of the reason of the disappearance at the menopause we know nothing.

Spontaneous Expulsion of Fibroids.

Complete cure also results from *spontaneous expulsion.* This occurs in three ways:—

(1.) By pediculation and extrusion of the tumour as a polypus (*v.* under Uterine Polypi);

(2.) By enucleation, in which the tumour is shelled *en masse* out of its bed;

(3.) By the breaking-down of its substance and consequent expulsion in fragments.

Spontaneous Enucleation of Fibroids.

Enucleation occurs in submucous and also in interstitial tumours. The mucous membrane of the capsule ulcerates, and the tumour is thus exposed; partly through suppuration, partly through uterine contractions, it becomes detached all along the line of its capsule and, being thus liberated, is expelled. This process is comparatively safe for the patient, though there is always the risk of hæmorrhage from the large veins in the capsule (fig. 251). In spontaneous enucleation, suppuration does not occur in the tumour itself but only in its capsule.

Breaking-down of Fibroids.

The *breaking-down* of the substance of the tumour is a much more dangerous process for the patient. As it is a slow one, there is a risk of absorption of septic matter. The commencement of this change is indicated by increase in the size of the tumour, which becomes tense and painful to the touch. There is a purulent fœtid discharge from the vagina, and sometimes hæmorrhage. The constitutional symptoms of loss of appetite and hectic fever afterwards develop, and most of such cases end fatally.

Expulsion of the tumour generally takes place per vaginam. As in other tumours we have inflammatory adhesions forming with neighbouring organs, followed by suppuration and perforation by the tumour. Thus calcified fibroids have perforated into the bladder, and have been mistaken for vesical calculi.[1] A fibroid has perforated into the rectum, and has been discharged per anum. In some cases adhesions with the abdominal wall have formed, and the tumour has been thus discharged.

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[1] He does not refer to a case observed by A. R. Simpson, and possibly others have been overlooked.

Causes of Death in Fibroids.

Considering the frequency of fibroid tumours, it is rare that *death* follows immediately from their presence. A fatal result, however, may follow from (1) suppuration in the tumour producing death from septicæmia, or a septic peritonitis; (2) uræmia, due to compression of the ureters; (3) direct hæmorrhage; (4) acute simple peritonitis.

PHYSICAL SIGNS: DIFFERENTIAL DIAGNOSIS.

The physical signs of fibroid tumours are usually so well marked that diagnosis is easy. In certain cases, however, diagnosis is very difficult; and when inflammation is superadded, certainty is impossible. Physical diagnosis is best considered under two heads: *a.* of small fibroid tumours, up to the size of a walnut or egg; *b.* of larger ones, which rise up as distinct tumours into the abdomen.

a. OF SMALL FIBROID TUMOURS.

Diagnosis of Small Fibroid Tumours.

1. Pediculated *submucous* fibroids should be easily recognised. When they are small and not projecting through the os, we have to dilate the cervix to ascertain their presence and attachment; when larger and projecting into the vagina, they may readily be mistaken for inversion of the uterus. On sweeping the finger round the base, we recognise the commencement of the cervical canal unless the polypus be adherent at its neck leading to obliteration of the canal (*v.* fig. 232). Further, the bimanual or rectal examination shows the fundus uteri to be in its normal position.

2. Small *interstitial* fibroids when situated *low down* and causing bulging of one lip of the cervix, give rise to difficulty; owing to the great enlargement of one lip, the os is displaced to the other side and its form altered to that of a mere slit which easily escapes observation. Such cases have been occasionally mistaken, even by the most experienced for inversion. This mistake is prevented by examination per rectum. Further, the sides and base of the tumour must be carefully scrutinised to discover the os; when this is found, the sound will show the position of the uterine cavity.

3. *Interstitial* fibroids placed *high up* in the uterus, or small *subserous* ones with a *broad base* of attachment, often escape detection. To ascertain their presence we proceed as follows. Pass the sound; this defines the course of the uterine canal and position of the fundus. Now make the bimanual examination with the sound, as represented in fig. 90; the finger in the anterior fornix detects the thickening of the anterior wall, produced by a small fibroid. Now steady the sound with the left

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[1] M'Clintock—*Dub. Quart. Jour.*, Feb. 1868.

hand, and pass the forefinger of the right hand into the rectum so as to feel the sound lying in the uterus. Should there be a fibroid in the posterior wall, the finger recognises an unusual thickness of tissue between it and the sound. Carry the sound, firmly grasped by the left hand, towards the symphysis, so as to bring the fundus better within reach of the rectal finger; and, by moving it from side to side, ascertain whether the tumour is intimately connected with the uterus so that it moves along with it. From their being largely composed of fibrous tissue, these tumours are firmer than the uterine wall; the *localised hardness*, therefore, helps us in recognising them.

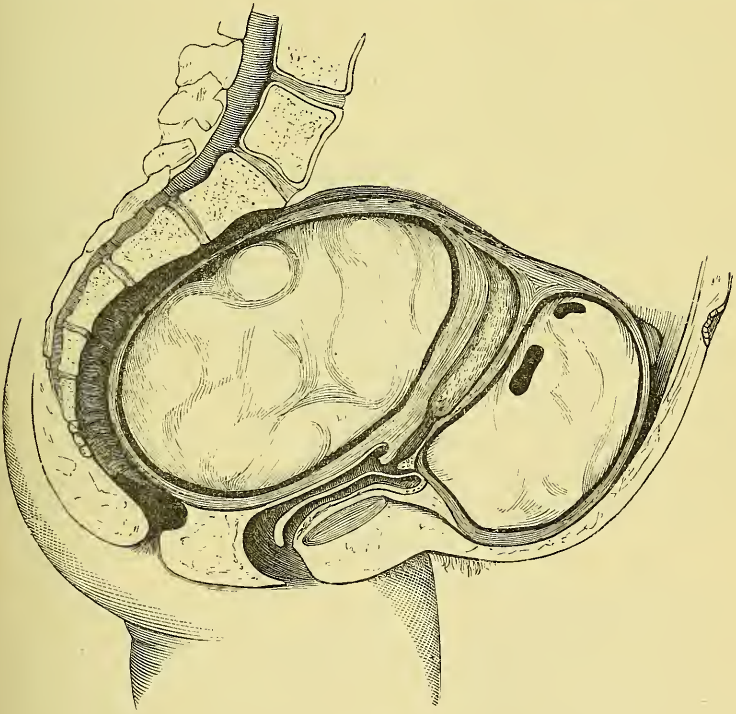

FIG. 252.
CASE OF TWO-AND-A-HALF MONTHS' PREGNANCY ASSOCIATED WITH TWO LARGE FIBROID TUMOURS—one in the anterior, the other in the posterior wall. The uterus and tumours were removed by Laparotomy (*Barnes*).

Differential Diagnosis of Small Fibroid Tumours.

Small fibroid tumours, when submucous or interstitial, require to be diagnosed from chronic metritis,
early pregnancy,
ante- and retro-flexion.

When subperitoneal and pediculated they must be differentiated

from enlarged Fallopian tube or ovary,
tumour or inflammatory collection in the broad ligament.

In *chronic metritis* the uterus is not globular but flat, and the enlargement is equable; the uterine canal is patulous; the os is everted, and shows catarrhal patches. We must remember that chronic metritis is occasionally present along with a fibroid tumour.

In *early pregnancy*, the uterus is soft and elastic: the cervix is generally softened, while in fibroids it remains hard. Pregnancy, however, may occur in a uterus which is already the seat of a fibroid tumour (fig. 252); and in such a case the diagnosis becomes certain only after the uterus is considerably enlarged. The possibility of pregnancy must specially be kept in mind here, as we involuntarily think of using the sound to aid in detecting fibroids.

Anteflexion is closely simulated by a fibroid in the anterior wall; a body is felt in the anterior fornix, continuous with it, but separated by a groove. Similarly, a fibroid in the posterior wall has all the characters of the *retroflexed fundus.* Examination by the sound (*v.* fig. 204), and especially by the sound plus the Bimanual, clears up the case.

Enlarged *Fallopian tube*[1] or *ovary* may closely resemble a pediculated subserous fibroid; they are not so firm and sharply defined, nor do they move so rigidly with the uterus. In the former also there are the history and symptoms of tubal disease. *Inflammatory collections* in the broad ligament are recognised by their history, the fixation of the uterus, and the changes they undergo; but *solid tumours* there cannot be diagnosed from pediculated fibroids except by exploratory incision.

b. OF LARGE TUMOURS.

When the tumour extends into the abdomen, we proceed with the systematic examination as described at page 90.

Diagnosis of Large Fibroid Tumours.

Palpation. The tumour has a well-defined outline, and a firm solid consistence. It is intimately connected with the uterus; this is best ascertained by laying hold of the cervix with the volsella, when the cervix will be found to move along with the abdominal tumour. Subserous fibroids have a certain range of free movement depending on the length of the pedicle. In soft fibroids, there may be intermittent contractions. *Percussion.* The note is absolutely dull, unless intestines come between the tumour and the abdominal wall. *Auscultation.* The uterine souffle is heard most distinctly at the sides, sometimes all over the tumour. As the uterine souffle simply means enlarged uterine arteries, there is no souffle when these are not enlarged; hence it is absent in subserous fibroids with a small pedicle. *Vaginal examina-*

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[1] Horrocks discusses this point in differential diagnosis in the *Brit. Med. Journ.*, 1886, I. pp. 441, 586, 821.

tion. Should the tumour be large and lifting the uterus into the abdomen, the cervix will be high up; or it may be displaced in various ways, according to the position of the tumour; it has a firm consistence. *Bimanual.* With pediculated subserous fibroids, the uterus is felt distinct from the tumour; with interstitial and submucous, we simply feel a large mass continuous with the cervix. *The Sound.* This should not be used till all possibility of pregnancy has been excluded. In doubtful cases, we wait three or four months till the positive signs indicative of pregnancy should have had time to develop. From the use of the sound we learn (1) the length, (2) the direction of the uterine cavity. The length of the cavity is always increased in submucous, and generally in interstitial, but not in subserous tumours; it may measure six or eight inches. The direction of the canal is often tortuous in submucous tumours; hence the passage of the sound is difficult, sometimes impossible. We feel that the sound goes so far and then catches on a hard projection. In such cases, a soft (No. 8) bougie is very useful, as its flexibility allows it to pass the obstruction. Usually, the sound passes to only one side of the tumour; sometimes we can sweep it more or less round the tumour, showing that it projects free into the uterine cavity (fig. 253).

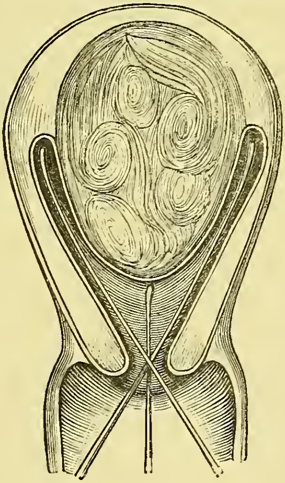

FIG. 253.
SOUND USED TO DETECT PEDICULATED SUBMUCOUS FIBROID (*Leblond*).

Differential Diagnosis of Large Fibroid Tumours.

Large fibroid tumours require to be diagnosed from—

Advanced pregnancy,
Ovarian tumours,
Extra-uterine gestation,
Hæmatocele and inflammatory deposits.

In *advanced pregnancy* the uterus is of softer consistence, and shows ballottement—the indication of a solid within a fluid; further, we can feel the parts of the fœtus. It becomes occasionally harder under the hand, specially if we make the patient change her position; this *variation in consistence* is a most valuable diagnostic, as it is rarely present in fibroid tumours. We hear the uterine souffle and, unless the child be dead, we hear in addition the *fœtal heart;* the possibility of the child's being dead should always be kept in mind. On vaginal examination, there is discoloration of the vaginal walls with free secretion; the cervix is softened. There is usually amenorrhœa corresponding in duration to the size of the uterus.

The diagnosis is not so easy as it appears on paper; witness a case[1] in which abdominal section was about to be done in a case of four months' pregnancy, which was not recognised, on the most careful examination, until the patient was under the anæsthetic. Such a case shows the necessity, in doubtful cases, of anæsthesia even for examination.

Ovarian tumours are soft and elastic; small ones may be firm. There is no uterine souffle. They only give rise to difficulty in diagnosis when they have become adherent to the uterus, and move along with it. It is sometimes impossible to diagnose between them and cystic fibroid tumours (*v.* Fibro-cystic Tumours).

Extra-uterine gestation presents great difficulty in diagnosis, especially when the gestation is in an undeveloped horn of the uterus. This condition may so closely simulate a fibroid that it may not be diagnosed till Abdominal Section has been made (*v.* p. 263). But we delay its consideration till the chapter on that subject.

In *hæmatocele and inflammatory deposits* we have the history of the attack to guide us. It may be impossible to form a diagnosis on first examination; but after watching the case for a few weeks and noting any change in the deposit in addition to ascertaining its precise situation, we can form a diagnosis. Pelvic peritonitis frequently occurs round a subperitoneal fibroid, or any fibroid producing pressure; and in such a case it is impossible to diagnose between the tumour and the effusion round it. Many cases reported of gradual absorption of a fibroid tumour under treatment were probably cases of mistaken inflammatory exudation.

PROGNOSIS.

In forming our prognosis we must take into account (1) the site of the tumour in the uterus, most favourable when subserous; (2) its position in the pelvis, whether low down and likely to become wedged within it; (3) the symptoms already present, of which *hæmorrhage* is the most important; (4) rapidity of growth, which by itself rarely forms a reason for interference. Though (as already said) they are rarely dangerous to life, they may cause the patient many years of suffering from which she only finds relief at the menopause.

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[1] *Brit. Med. Journ.* 1886, II. p. 474.

CHAPTER XXXVII.

FIBROID TUMOURS OF THE UTERUS: TREATMENT.

LITERATURE.

Atlee—The treatment of the fibroid tumours of the uterus: Internat. Med. Cong. Trans., Sept. 1876. *Bantock*—British Medical Journal, 1881, p. 426. *Bigelow*—Gastrotomy for Myofibroma of the Uterus: Amer. Jour. Obstet., Nov. and Dec. 1883, Jan. to March 1884. *Duncan, Matthews*—Diseases of Women: London, 1883, p. 289. *Fritsch*—Sechzig Fälle von Laparomyomotomie mit epikritischen Bemerkungen über die Methoden dieser Operation: Volk. Samml., No. 339. *Greenhalgh*—On the use of the actual cautery in the enucleation of fibroid tumours of the uterus: London Med. Chirurg. Trans., Vol. LIX. *Hegar u. Kaltenbach*—Die operative Gynäkologie: Stuttgart, 1881, S. 416. *Hofmeier*—Die Myomotomie: Stuttgart, F. Enke, 1884. *Keith*—Surgical treatment of tumours of the abdomen: Edinburgh, 1885. On Supra-vaginal Hysterectomy, with remarks on the principle of the Extra-peritoneal method of treating the pedicle: Brit. Med. Journ., Dec. 8, 1883. Thirteen cases of Hysterectomy, with remarks on Carbolic Acid Spray in Abdominal Surgery: Brit. Med. Jour., Jany. 31, 1885. *Leblond*—Traité élémentaire de Chirurgie gynécologique: Paris, 1878. *Martin*—Pathologie und Therapie der Frauenkrankheiten: Wien und Leipzig, Urban und Schwartzenberg, 1887. *Palmer*—Laparotomy and Laparo-Hysterotomy, their indications for fibroid tumours of the uterus: Americ. Gyn. Trans., 1880, p. 361. *Schroeder*—Handbuch der Krankheiten der weiblichen Geschlectsorgane: Leipzig, F. C. W. Vogel, 1886. *Simpson, A. R.*—The treatment of fibroid tumours of the uterus: Contributions to Obstetrics and Gynecology, Edinburgh, 1880. *Sims, Marion*—On intra-uterine fibroids: New York Medical Journal, April 1874. *Thornton*—Cases of Hysterectomy, with remarks on the value of the Carbolic Acid Spray in the operation: Brit. Med. Journ., May 23, 1885. *Wells, Spencer*—On Ovarian and Uterine Tumours, etc.: London, 1882. See also references in the text, and Index of Recent Gynecological Literature in the Appendix.

THIS is best considered under the heads of medical treatment, including that by electricity, and surgical treatment.

MEDICAL TREATMENT.

Under this head we include the administration of such medicines as ergot and hydrastis canadensis, and the use of electricity.

Ergot in Fibroids.

There is no medicine which acts immediately upon fibroid tumours so as to cause disintegration and absorption. We have, however, a very important remedy in *ergot of rye;* the beneficial effects of this have been brought forward by Hildebrandt,[1] and by A. R. Simpson, whose paper on the treatment of fibroids may be consulted for illustrative cases.[2] It acts beneficially in two ways—by checking their nutrition through diminishing the amount of blood circulating to them, and by favouring their pedunculation and expulsion; these are both due to its action on the unstriped muscular fibre of the walls of the uterus and coats of the blood-vessels.[1] Success in its use depends, according to Simpson, on securing that the preparation of ergot used be active, that it be properly administered, and that the case be a suitable one. The formula for the preparation which he recommends is—

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[1] *Berl. klin. Wochenschrift*, 1872, No. 25.

[2] Dobronrawow gives two cases in which size of tumour distinctly diminished—*Centralb. f. Gyn.* 1886, S. 16.

℞ Ergotinæ ʒii.
Aquæ ʒvi.
Chloral-hydratis ʒss. M.

Administration of Ergotin Subcutaneously.

Three grains of ergotin are contained in twelve minims of the fluid, which is a good medium dose. Chloral is added to make the solution keep; but even with this it becomes after some weeks unfit for use, and should therefore be made up repeatedly and in small quantities.

It is administered with the ordinary hypodermic needle. Care must be taken that the syringe contains no air; this is best secured by holding it with the needle upwards and squirting out some of the liquid. The injection is made in the gluteal region, which is readily done when the patient is lying on her side; and on the right and left sides alternately, so as to diminish the frequency of punctures in the same region. Enter the needle vertically and plunge it rapidly *deep into the muscle*, the point entering to the depth of from an inch to an inch and a half; now empty the syringe, and quickly withdraw the needle. After use, remember to cleanse the needle with water and to replace the wire in it. The patient soon becomes accustomed to the prick of the needle and, if it be entered deeply into the muscle, there is little fear of local suppuration; after three years' experience we have seen this in but one case, and this was probably due to a bad preparation of the solution. For the first few weeks the injections may be made twice a week, afterwards only once a week. The treatment is continued for several months until its effect is seen in diminution of the size of the tumour or, at least, of the hæmorrhage from it. The suitable cases are those in which the tumour is intra-mural or submucous; "it must be surrounded by layers of muscular fibre, sufficiently developed to be capable of being excited to contraction."

When the patient cannot be seen frequently by a physician, a friend or a nurse should be instructed how to apply the needle. Ergotin can also be administered in the form of pill, suppository (4 grs. in each) or liquid extract (30 drops thrice daily). When given by the mouth, however, it does not act so quickly or surely as when given hypodermically.

Hydrastis Canadensis,[2] fifteen minims to one drachm of the tincture or up to four drachms of the liquid extract, is now being used instead of ergot; it does not disturb the digestive system by causing constipation as ergot sometimes does.

Bromide of Potassium in Fibroids.

Bromide of potassium was recommended by Sir J. Y. Simpson, who believed that it had a marked influence in checking the growth and even in reducing the size of fibroid tumours. Being a nervine sedative, it is useful in cases where the only symptoms are discomfort from the presence of the tumour or neuralgic pain. As a prolonged use of the bromide is generally necessary, small doses (ten grains, three times a day) should be administered.

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[1] Ringer—*Brit. Med. Journ.*, Jan. 19, 1884.

[2] Rutherford gives five cases treated by it—it controlled hæmorrhage, but had no effect on size of tumour—*Brit. Med. Journ.*, 1888, II. p. 123.

When the patient can afford it, benefit is undoubtedly derived from a course of treatment of *mineral waters* (such as those of Kreuznach) as recommended for chronic metritis.

In the case of growing tumours, keeping the patient on a low *non-stimulating diet* is beneficial; the full diet and free use of stimulants, to which a patient inclines to make up for the loss of blood, rather favour the growth of the tumour.[1]

The symptoms due to the weight of the tumour may be relieved by *artificial support.* Thus patients with a small fibroid often derive great benefit from wearing a Hodge pessary; the discomfort of a large abdominal tumour is materially lessened by wearing a broad flannel bandage.

When the tumour nearly fills the pelvis and is beginning to press injuriously upon the bladder and rectum, we should, when possible, *push it up out of the pelvis* into the abdomen; this is done before the occurrence of pelvic peritonitis, which may hopelessly bind it within the pelvis. The most favourable case for this manipulation is a subserous fibroid with a distinct pedicle.

TREATMENT OF FIBROIDS BY ELECTRICITY.

More than twenty years ago, Tripier of Paris treated uterine fibromata with Faradisation, and as far back as 1867 Althaus wrote in the *British Medical Journal* on the electrolytic treatment of tumours;[2] while in America in 1870, Cutter[3] began to use galvanism for the treatment of fibroid tumours. It is, however, to Apostoli that the credit is due of elaborating the electrical treatment of fibroids and bringing it prominently forward before the profession.[4]

The technique will be more fully described in the chapter on Electricity in the Appendix. Here we need only say that the internal electrode consists of a platinum rod the thickness of a uterine sound, sheathed in a vulcanite tube except over the portion within the uterus. The external electrode consists of a pad of clay laid on the abdomen, having a copper or leaden plate connected with the battery wire. The internal electrode is usually negative unless hæmorrhage is the chief symptom, in which case it is made positive on account of the hæmostatic action of that pole. The current strength used varies from 70 to 100 milliampères for the first application, increased afterwards to 200 or even 250 milliampères.

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[1] See J. Knowsley Thornton on the Treatment of Uterine Fibro-myoma—*Lancet*, 1886, II., p. 811.

[2] See letter by Althaus in the *British Medical Journal*, 1887, I., p. 1364.

[3] *Amer. Journ. Obs.*, 1888, p. 384.

[4] In his paper read at the Dublin meeting of the British Medical Association in 1887, "On the Treatment of Fibroid Tumours of the Uterus by Electricity with Observations and Complete Statistics of all the Cases so treated from July 1882 to July 1887.—*Brit. Med. Jour.*, 1887, II., 699.

Electricity in the treatment of fibroids is still on its trial. It is only two or three years old, and as yet we have not data for coming to any definite conclusion as to its value; and there is a remarkable divergence of opinion on this subject. On the one hand, we have Keith, who has had great success in the removal of fibroid tumours by abdominal section, in one of his most recent utterances,[1] saying—

> "Apostoli's treatment puts a woman with a fibrous tumour who suffers much into the position of a woman with a fibrous tumour who does not suffer or may be even unaware of its presence. It does not bring about the disappearance of the tumour, or it does so very rarely, but size is lessened more or less—one-half, one-third, two-thirds. . . . . What I now plead for is, that for a time all bloody operations for the treatment of uterine fibroids should cease, and that Dr Apostoli's treatment as practised by him should have a fair trial."

On the other hand, we have Steavenson, who has charge of the Electrical Department of St. Bartholomew's Hospital, writing recently as follows[2]—

> "In my paper referred to [St Bartholomew's Hospital Reports], I have said that 'compared with other methods it is probably the best short of actual operation.' I have admitted that the results are not so brilliant as we could have wished, or as we were led to hope they would be. All the palliative modes of treatment of uterine fibroids are eminently unsatisfactory, and the profession would have hailed with delight any mode of treatment that would have promised a cure. This certainly electricity does not accomplish, at any rate with tumours of any size; but there is no doubt that in the majority of cases the symptoms are relieved, and one of the most troublesome that yields to electrical treatment is that of hæmorrhage. Improvement will also take place under the administration of ergot and by the imbibition of the iodo-bromine waters of Kreuznach and Woodhall Spa. . . . It certainly is a question whether in their case [*i.e.* hospital patients] the advantage obtained by the electrical treatment is sufficiently great over other modes of treatment as to call for the expenditure of the time and trouble necessary for carrying it out."

From the foregoing it will be seen that the application of electricity to fibroids is in great measure a *treatment of symptoms*. It finds its place alongside of ergotin, being perhaps more certain, but, on the other hand, exacting more time and trouble in its use.

Looking over the literature, and selecting only the reports of more than ten cases treated by this method, we find the following results:—

Apostoli[3] mentions 278 cases of "fibromata or hypertrophy of the uterus," treated by "4246 applications of the continued current of electricity"—the positive pole being applied to the uterus or tumour 2518 times, and the negative 1726. As to results, he says, "I can affirm that when there has been no negligence and my advice has been fully acted upon, 95 times out of 100 permanent benefit has been acknowledged."

Cutter[4] records details of 50 cases, with the following results: 11 cured, 3 relieved, 25 arrested, 4 fatal, 7 non-arrest.

Delétang[5] mentions its use in 97 cases, with the result that hæmorrhage stopped, pain and functional disturbances were relieved, the fibromata shrunk, but this last result was not invariable.

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[1] *Brit. Med. Jour.*, June 8, 1889.

[2] *Lancet*, April 6, 1889.

[3] *Brit. Med. Jour.*, 1887, II., p. 699.

[4] *Amer. Jour. Obs.*, 1887, p. 113.

[5] *Brit. Med. Jour.*, 1888, II., p. 1412.

Skene Keith[1] mentions 13 cases, in all of which the tumour was reduced and symptoms relieved. In a later article, Thomas Keith[2] speaks of its having been used in considerably over 100 cases, the majority being uterine fibroids; in every case, the tumour was reduced in size, hæmorrhage and pain gone, and general health restored.

J. H. Martin mentions 14 cases, in which 4 were benefitted, 5 symptomatically cured, 5 completely cured.

SURGICAL TREATMENT.

This consists in the removal of the tumour through the vagina, or through the abdominal walls. Removal of the uterine appendages is also done with a view to check hæmorrhage and the growth of the fibroid.

a. REMOVAL THROUGH THE VAGINA.

Removal of Polypi.

We have seen that this process takes place *spontaneously*, either by pedunculation and extrusion as a polypus or by enucleation. In *operating*, we simply favour these natural processes. The former will be described under "Treatment of Polypi" (see Chapter XXXIX.).

Enucleation of Fibroids.

We favour enucleation of the tumour (1) by dilating or dividing the cervix uteri; (2) by incision of the mucous membrane covering the surface of the fibroid; (3) by stimulating the uterus to contract and expel it spontaneously from its bed, or by laying hold of and forcibly detaching it. These might be considered either as different consecutive operations, or as successive steps in the same operation.[4]

The *dilatation of the cervix* is affected in any of the ways already described. Sometimes this is all that is required. After dilatation or division of the cervix, the hæmorrhage (which is usually the indication for the operation) ceases; if the tumour is in the process of expulsion, this takes place more readily through the dilated cervix.

Should this operation be insufficient, we proceed next to *incision of the mucous membrane covering the tumour.* The purpose is twofold. (1.) It checks hæmorrhage. We have referred to the existence of venous sinuses in the capsule of the tumour, from which profuse hæmorrhage sometimes occurs (*v.* fig. 251); when these are cut through, they retract and are closed by thrombi. After this operation the hæmorrhages are, for a long period at least, checked. (2.) It favours spontaneous enucleation of the tumour, which comes to protrude through the incised mucous membrane.

The mucous membrane is incised either with the bistoury or with the thermo-cautery as follows. Carry a probe-pointed bistoury, which has the lower half of the blade sheathed, into the uterus through the previously dilated cervix; make one or more incisions, about an inch long and from a quarter to half-an-inch deep, upon the surface of the tumour. The great danger of the operation is the introduction of septic matter; to diminish this risk, Greenhalgh employs the actual cautery with an olive-shaped bulb to incise the mucous membrane and at the same time to destroy the heart of the tumour; he also uses it to burn away, from time to time, portions of the tumour as they protrude through the capsule. It is evident that the cautery can be used only when we have an interstitial fibroid which has forced itself into one lip of the cervix and projects markedly into the roof of the vagina (*v.* fig. 249); or when a submucous fibroid has dilated the os sufficiently to become accessible to the cautery. The cautery, of which the Paquelin is the most convenient form, reduces the dangers of hæmorrhage and septic infection to a minimum.

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[1] *Edin. Med. Jour.*, xxxiii., I., p. 470, and xxxiii., II., pp. 670 and 688.

[2] *Brit. Med. Jour.* 1887, II., p. 1258.

[3] *Amer. Jour. Obs.*, 1888, p. 643.

[4] Matthews Duncan—*Edin. Med. Jour.*, Feb. 1867.

The separation of the tumour should be left to the natural efforts, and may extend over a period of months; during this time, to promote uterine contractions, the patient is kept fully under the influence of ergot. Greenhalgh remarks that "spontaneous expulsive efforts shortly followed the use of the cautery."

Should sloughing of the tumour occur during the process of natural enucleation, we interfere to remove the tumour rapidly. Even although there is no sloughing it is sometimes necessary to shell the tumour out of its bed. The detachment of the tumour from its capsule may be effected by A. R. Simpson's nail curette (fig. 254). It is intended, as its name implies, as a substitute for the finger nail which would be the best instrument were it only strong enough to scrape through the tissues. Thomas has devised a similar instrument which has the form of an elongated spoon with a serrated edge; it is worked with a pendulum-like movement of the hand. The advantages claimed for it are that it limits hæmorrhage and, from its concave form, "hugs the tumour" so as not to cut deeply into the uterine wall. Before operating, he measures with a whalebone probe the extent of attachment of the tumour to the wall of the uterus. He has "operated more than twenty times with this spoon-saw, and its efficiency becomes more and more apparent with increasing experience."

Dangers of Enucleation.

With regard to *enucleation* and removal per vaginam, from the risks of the operation, it is now done only when the symptoms justify a critical operation[1] or when nature has begun but is unable to complete the process of expulsion. The circumstances most favourable for removal by this means are when the tumour is small and loosely connected with the uterus, or when it has been already "born" into the lax and roomy vagina of a multipara.

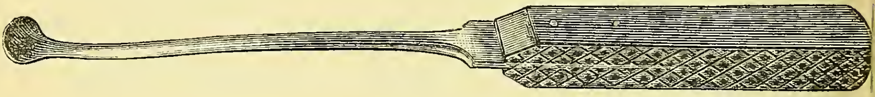

FIG. 254.

A. R. SIMPSON'S NAIL CURETTE ⅔ (*A. R. Simpson*).

In addition to the difficulties of removal, the great risk is *septicæmia* from the sloughing fragments.

b. REMOVAL THROUGH THE ABDOMINAL WALLS BY LAPAROTOMY.

In the removal of fibroid tumours by laparotomy, there have to be considered various methods of operation which must be kept quite distinct, especially in judging of the results of myomotomy—as these present all degrees from a simple to a complicated and critical operation.

The methods vary according as we have to do with a tumour which is (1) subserous and pediculated; or (2) growing from the serous aspect but between the layers of the broad ligament or into the cellular tissue, or (3) growing within the substance of the wall.

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[1] Kleinwächter makes the mortality 15 p. c. or 22 out of 147 cases which he has collected—*Wien. med. Presse*, No. 42, 1887.

In the case of *subserous pediculated tumours*, the pedicle can be treated intra-peritoneally as in ovariotomy, *i.e.* transfixed and ligatured in two portions, though it is desirable, in addition, to bring together with catgut the edges of the peritoneum over the end of the stump; or the extra-peritoneal method, to be presently described, may be adopted.

Statistics for this operation are difficult to gather, as simple myomotomies are mixed up with hysterectomies in the reports of operators. Hofmeier mentions 21 cases with 2 deaths from Schroeder's clinique;[1] Martin had 10 with 3 deaths; and Tauffer 8, all of which were successful.[2] Bantock in his last series of one hundred cases of abdominal section specified nine cases in which the pedicle was treated extra-peritoneally with the serre-nœud and all recovered.[3] In going over the literature, we have come upon other cases by Albert, Hill, Kelly, Kümmell, Mann, Mundé, Tait, and others.

The *second class* of tumours demands a more serious operation, implying their enucleation from the peritoneum or cellular tissue. The cavity thus produced may be either sewed up with catgut and the abdominal incision closed;[4] or its margins may be stitched to the open abdominal wound, the hollow being packed with iodoform gauze.[5]

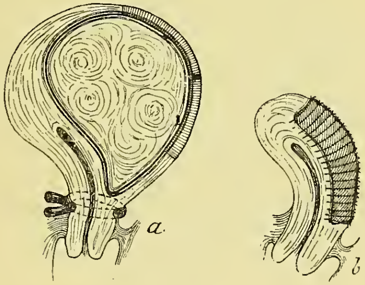

FIG. 255.

MARTIN'S OPERATION FOR ENUCLEATION OF FIBROID FROM WALL OF UTERUS (*Martin*).
a. Shows uterus with temporary elastic ligature round it; the shaded portion of capsule being the extent of incision in it. *b*. Shows how the hollow in uterine wall is closed by sutures.

The third condition, when the fibroid is in the *substance of the wall*, gives occasion for two quite distinct methods of operation—enucleation from the wall, and hysterectomy.

1. *Enucleation* of the tumour *from the uterine wall* with sewing up of the hollow thus produced is an operation introduced by Martin of Berlin. The cases in which it can be done are limited; but, where it is possible, it has the double advantage of being a less serious operation than hysterectomy and not mutilating the uterus. He has done it sixteen

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[1] Hofmeier—*Loc. cit.*
[2] Dirner—*Centralb. f. Gyn.* Vol. XI. S. 98.
[3] *Lancet*, 1887, I., p. 518.
[4] As in recent cases by Baumgärtner and Veit—*Centralb. f. Gyn.*, Bd. XI., S. 771.
[5] As in Rokitansky's case—*Ibid.* S. 839.

times,[1] with three deaths in the first five cases and none in the last eleven.

After the uterus has been exposed by abdominal section and drawn forward into the incision, a temporary elastic ligature is thrown round the broad ligaments; this is not necessary in all cases, as with a mesial incision the bleeding may be but slight. A longitudinal incision is made over the tumour which is shelled out of its capsule: the margins of the cavity are then trimmed with scissors, considerable portions of the muscular wall and all the connective tissue portion of the capsule being sometimes excised; and the wound is closed by continuous deep and superficial juniper catgut sutures. The uterine cavity may be opened into during the operation, but if it be disinfected or packed with iodoform gauze[2] (extending down into the vagina for ease of removal) which acts as a drain, it does not affect the prognosis. (*v.* fig. 255.)

Fränkel in an elaborate paper on this operation makes twenty-four cases reported on (by Martin, Schroeder, Ruge, Veit, Hegar, and himself), with six deaths or a mortality of 25 p.c. Going over the literature given in the Index in the Appendix, we have come on five cases of a similar operation (enucleation of a tumour from the uterus with sewing up of the wound in it) by Freund,[3] Karström,[4] Rein,[5] in all of which there was recovery.

2. *Hysterectomy.*—By hysterectomy we mean that a portion at least of the uterus is cut away with the tumour, leaving a stump of cervix and more or less of body of uterus (with its cavity cut across) according to the height of the tumour in the uterine wall. Strictly speaking, this is only a "supra-vaginal amputation;" but the term "hysterectomy" has come into use and is convenient if we remember that only in very rare cases[6] is the *whole* uterus cut out.

HYSTERECTOMY FOR FIBROIDS.

This operation may be divided into three stages:—(1) The opening into the abdominal cavity, (2) the extraction of the tumour, (3) the treatment of the stump.

1. The opening into the abdominal cavity is made as in ovariotomy, but the incision may in some cases extend from ensiform cartilage to pubes (*v.* Chap. XXIV.). The bladder is sometimes high up and may have to be separated off the tumour. As it is more easily defined when distended, it should not be emptied before the operation.

2. The tumour is brought out through the abdominal incision. When the mass is large, it may be difficult to draw the slippery tumour out; to have purchase on it, Thornton screws a nickel-plated corkscrew with a broad blade into it. Péan diminishes the size of the tumour by

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[1] From 1880 to 1886. See Czempin—Ueber die Enucleation intraparietaler Myome nach A. Martin: *Zeits. f. Geb. u. Gyn.*, Bd. XIV., S. 223. Five still more recent cases by Martin are mentioned but not reported on.

[2] As Fränkel did in his two cases—Ueber die Enucleation submucöser oder intraparietaler Myome von der Bauchhöle aus (Martin'sche Operation), etc.: *Archiv f. Gyn.* Bd. XXXIII., S. 449.

[3] *Centralb. f. Gyn.*, Bd. XII., S. 801. [4] *Ibid.*, Bd. XI., S. 647. [5] *Ibid.*, Bd. XII., S. 852.

[6] Dixon Jones has recently recorded one (*Amer. Jour. Obs.*, 1888, p. 604).

"morcellement"—cutting off portions with the wires of the serre-nœud.

3. The treatment of the stump is by either the *intra-peritoneal* or the *extra-peritoneal* method.

Intra-peritoneal Treatment of Pedicle in Laparotomy for Fibroids.

In the intra-peritoneal method, the stump after being ligatured is, as already said, dropped into the peritoneal cavity as in ovariotomy; in the extra-peritoneal, the stump is brought into the abdominal incision and fixed there so as to be outside of the peritoneal cavity.

Schroeder, Martin, and some other operators prefer the former plan. Schroeder, who was a great advocate of this method, proceeded as follows:—

The ovarian arteries—the course of which is seen in Plate VI.—were first ligatured on each side. These can be recognised by feeling their pulsation with the finger; or by holding the ligament against the light, when their course is easily seen. A double silk ligature was carried on a needle from behind through the cervix so as to come out at the bottom of the vesico-uterine pouch in front; this was divided and the end of each half carried backwards through the broad ligament of its respective side, just external to the cervix, and knotted to its corresponding end; the cervix was thus tied in two portions, each uterine artery—the position of which is seen in Plate VI.—being controlled by a ligature. The tumour, with the body of the uterus and the ovaries, was cut away rapidly, with a large knife, above the ligatures. The uterine stump was cut in a V shape; and first the muscular walls were adapted with coarser, then the peritoneal covering with finer silk sutures.

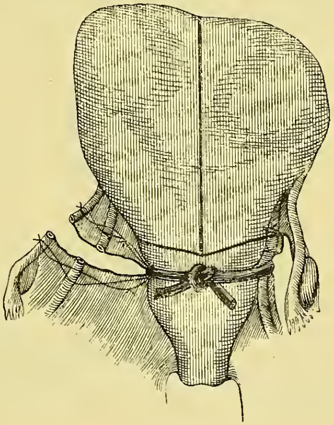

FIG. 256.

SUPRA-VAGINAL AMPUTATION OF UTERUS FOR FIBROID TUMOUR (*Martin*).

This shows two modes of treating the Broad Ligament before going on to amputation. On the left side, the elastic ligature is placed above the infundibulo-pelvic ligament—the Ovary and Tube having been tied and separated. On the right side, the Broad Ligament has been tied in two places (each ligature forming three loops) and divided between them so as to allow the elastic ligature to get close up to the uterus. The dark lines show Martin's lines of excision—the vertical to take out the tumour, the transverse to amputate uterus and make the stump.

Martin, who also has adopted the intra-peritoneal method, uses the elastic ligature to constrict the uterus before suturing the stump. As it is difficult to get the ligature to clasp the lower segment of the uterus owing to the opposing tension of the broad ligaments, these have to be divided first (*v.* fig. 256). The mass is next incised longitudinally (*v.* fig. 256) and the tumour turned out. The uterus is then amputated, the line of incision running slightly downwards from the sides so as to be half an inch above the elastic ligature in the mesial line. The cavity cut into, whether of body or cervix, is cleansed with 1 p.c. solution of perchloride of mercury and then sewed up (*v.* fig. 257). Finally, the cup-shaped hollow of the stump is closed with deep silk sutures and superficial catgut ones. An opening is made from the pouch of Douglas into the posterior fornix and a drainage tube inserted. Zweifel[1] recommends tieing the pedicle in three or four separate portions and then stitching the peritoneum over the end of it: he ties the broad ligaments first and then separates them from the uterus; after this, the elastic ligature is applied temporarily and the tumour cut away, and the stump then transfixed and ligatured in three or four pieces.

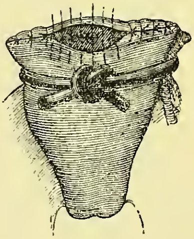

FIG. 257.

SUPRA-VAGINAL AMPUTATION OF UTERUS (*Martin*).

This shows deep stitches closing cervical canal (*a*), and position of sutures (of which some are deep and others superficial) closing-in muscular wall and peritoneum.

Dixon Jones[2] has recorded recently a successful case of this operation in which she separated the uterus below from its attachments to the vagina, clamped the broad ligaments with forceps which were left in the vagina and served also to drain the peritoneal cavity.

Extra-peritoneal Treatment of Pedicle in Laparotomy for Fibroids.

The *extra-peritoneal* method has been carried out by the following means:—

The ligature or clamp,
The clamp and cautery,
The serre-nœud,
The elastic ligature.

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[1] *Archiv f. Gyn.* XXXII. S. 473. He has treated the last 9 of 23 cases thus and with the best results.

[2] *Amer. Jour. Obstet.*, 1888, p. 604.

Clamp.

The extra-peritoneal method was, we believe, first attempted by Spencer Wells. Comparing the two methods, he says, "When it has been possible to secure the pedicle and fix it outside the wound in the abdominal wall, the result has been much more satisfactory." Of 28 cases, in which the method is specified, 15 were extra- and 13 intra-peritoneal. In 6 of the 15 cases, the pedicle was retained in the wound by means of *a clamp;* in the rest by means of *the ligature*, aided in some cases by use of a pin.

Clamp and Cautery.

The searing of the stump with the *actual cautery* without any ligatures, is the modification of the extra-peritoneal method adopted by Thomas. He uses a *clamp* to arrest hæmorrhage during the amputation of the uterus and while the pedicle is being seared. It is in two separate portions; the one half is placed below the neck of the tumour or uterus, and the other then adapted to it and screwed down. To prevent retraction of the pedicle, it is before cauterisation transfixed above the clamp with long wire needles. After cauterisation the clamp is loosened, but left *in situ* for fourteen days so as to be screwed up should hæmorrhage occur.

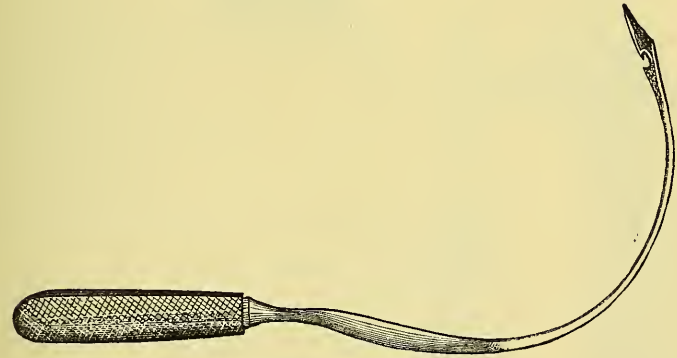

FIG. 258.

PÉAN'S CURVED NEEDLE FOR CARRYING THE WIRES THROUGH THE STUMP OF THE CERVIX (*Leblond*).

Serre-nœud.

The extra-peritoneal method has met with great success in the hands of Péan of Paris, who has the merit of having elaborated it as a distinct method. He operates as follows. The tumour having, if necessary, been reduced by "morcellement," it is drawn out of the abdomen and held perpendicularly by an assistant. The operator, having ascertained with a sound the relations of the bladder (which only in rare cases requires to be dissected off), transfixes the cervix with two strong wires at right angles to each other. Below these wires, the curved needle represented at fig. 258 is carried through the cervix and drags back a double wire. This wire is divided, and each half is fitted into a *serre-nœud* of Cintrat (fig. 259) by means of which it is both tightened and twisted. The tumour and uterus are amputated above the wires. The pedicle is placed in the abdominal wound, and is kept from retracting into the abdomen by means of the wire and the serre-nœud; these are left in position so that they may be tightened in case of hæmorrhage.

In Koeberlé's serre-nœud (the one generally used in this country) the wire is not fixed by twisting up, but the instrument and wire are left on the stump so that the loop can be further tightened up at any time. Polk[1] advises stripping down the peritoneum round the stump so as to place the wire between the former and the muscular tissue, thus treating the stump like an enucleated parovarian cyst.

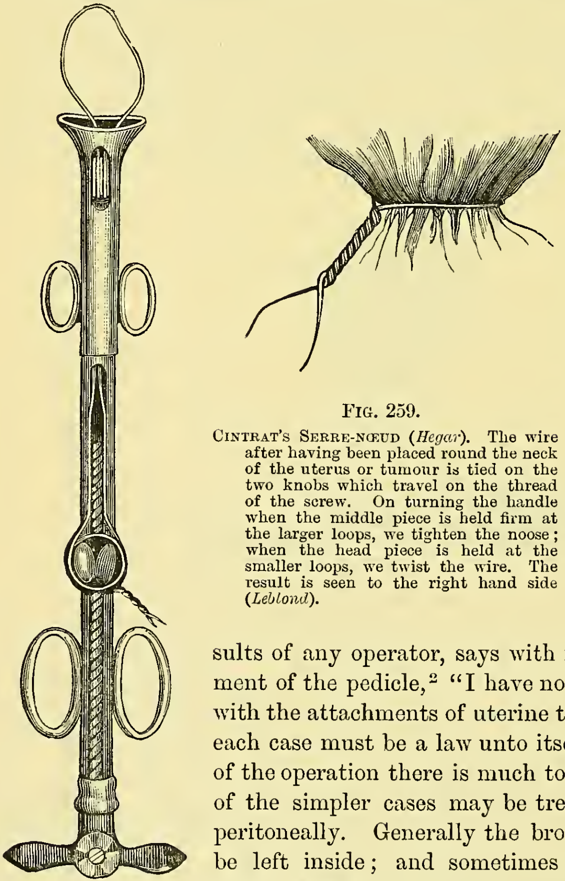

FIG. 259.

CINTRAT'S SERRE-NŒUD (*Hegar*). The wire after having been placed round the neck of the uterus or tumour is tied on the two knobs which travel on the thread of the screw. On turning the handle when the middle piece is held firm at the larger loops, we tighten the noose; when the head piece is held at the smaller loops, we twist the wire. The result is seen to the right hand side (*Leblond*).

Keith's Method.

Keith, who has had the best results of any operator, says with regard to the treatment of the pedicle,[2] "I have no one way in dealing with the attachments of uterine tumour. At present each case must be a law unto itself, and of this part of the operation there is much to be learned. A few of the simpler cases may be treated entirely extra-peritoneally. Generally the broad ligaments must be left inside; and sometimes the whole attachment, when there is much enucleation, must be so treated. Sometimes the treatment may be entirely intra-peritoneal by means of Koeberlé's *serre-nœud*, or it may be half intra- and half extra-peritoneal. These cases require much care in the after-dressing, though the convalescence is much shorter than when the whole is left outside.

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[1] *Amer. Jour. Obstet.*, 1889, p. 629.

[2] *Brit. Med. Jour.*, Jan. 31, 1885.

I am hopeful that the cautery will yet be the best and safest of all the methods of dealing with some of these tumours." In his monograph on "Surgical Treatment of Tumours of the Abdomen," he says, "At first I used Koeberlé's instrument, which is still the best for this purpose; but for long I have given it up in favour of a very large thin clamp, and I think that this is a safer way. I have not found sloughing take place to the extent that it does when a single wire merely embraces the pedicle. . . . Before applying the clamp, it is better to draw all the parts gently together by a thick silk ligature or by a soft wire. This prevents a too great spreading out of the parts between the blades, which would render the closing of the wound around the clamp somewhat troublesome. As soon as the tumour has been cut away, he scoops out and disinfects the cervical canal in the stump. A saturated solution of perchloride of iron is then freely applied to the stump, the superfluous solution dried off, iodoform dusted over, and salicylic wool used as dressing. His clamp is shown at fig. 260.

The elastic ligature was introduced by Kleeberg. Its method of employment has been devised and carried out by Hegar of Freiberg, in whose hands (as already said) it has produced good results. Hegar's method consists in "constriction of the uterine stump with elastic ligatures, exact closure of the abdominal cavity by stitching the peritoneum round the stump, and antiseptic treatment of the latter with the cautery and chloride of zinc."

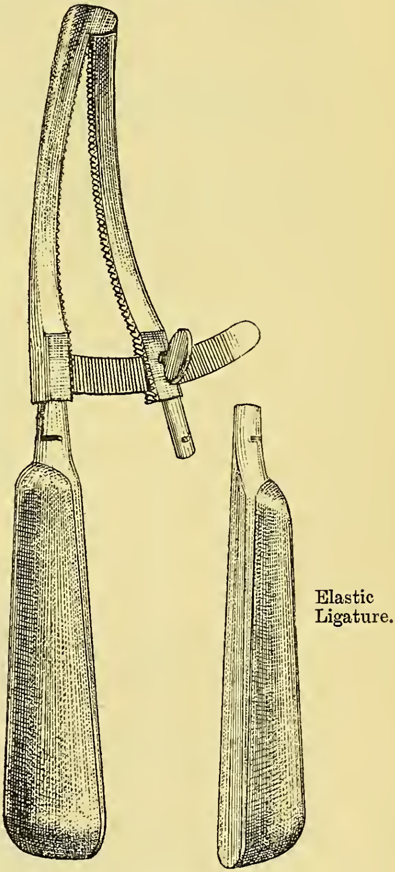

FIG. 260.
KEITH'S CLAMP FOR SECURING THE PEDICLE EXTRA-PERITONEALLY.

The abdominal incision is always made long enough to allow the tumour to be projected through it without artificial diminution. Temporary sutures are placed along its margins to keep the peritoneum in relation to the skin. Vascular adhesions are ligatured in two places and divided between. The tumour is laid hold of with a dry towel by one assistant and raised out of the abdomen, while another presses the edges of the abdominal wound behind the advancing tumour; the greatest care is required to hold the tumour steadily and vertically, as the stretched broad ligaments readily tear—leading to hæmorrhage. The relations of the bladder and the ovaries having been exactly ascertained, the elastic ligature is placed round the cervix below the seat of amputation. This consists of a double ply of india-rubber ligature 5 millimetres thick. While kept at full stretch it is brought round the uterus and firmly knotted. Should this constriction of the whole stump be judged insufficient, it is further ligatured in two portions with the elastic ligature. The needle represented at fig. 261 is used to carry through the stump a double ligature, which is then divided and tied round each half. The tumour and uterus

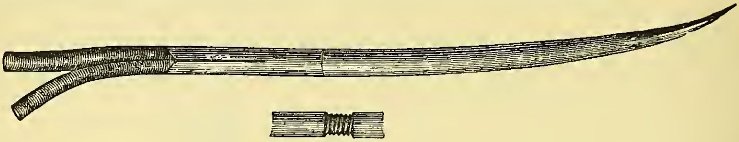

Fig. 261.

Needle for carrying through elastic ligature. It consists of a sharp curved point, and a canula split halfway up the side. A loop of the elastic ligature, stretched till it is thin, is drawn with a thread into the canula, which is then screwed into the steel point (*Hegar und Kaltenbach*).

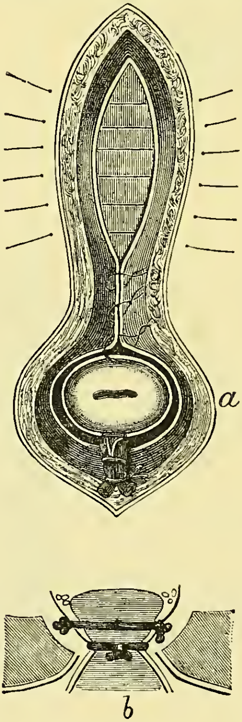

Fig. 262.

Treatment of Fibroid Tumours by elastic ligature (*Hegar und Kaltenbach*).

a, Abdominal incision with the stump in its lower angle; only the peritoneum is brought together with the lower sutures, while the upper sutures take in the whole abdominal wall. *b*, Same in section, to show the trough floored by the peritoneum round the stump and the position of the elastic ligatures.

are amputated above these ligatures. The peritoneum is now carefully adapted round the neck of the stump beneath the elastic ligature ; the silk suture, which brings only the edges of the peritoneum together in the bottom of the wound just below the pedicle, is looped into the side of the latter (fig. 262 *a*) underneath the ligature (fig. 262 *b*) : the margins of the peritoneum above the pedicle are united in a similar way ; the next two sutures of the wound bring together only the peritoneum, while those further up bring together all the coats of the abdominal wall. Thus there is produced a space which surrounds the pedicle and is floored by the peritoneum ; to keep this space thoroughly dry and aseptic, is the aim of the after-treatment. The projecting end of the stump is thoroughly cauterised ; the raw surfaces round it are painted with solution (3-10 per cent.) of chloride of zinc ; and cotton wadding, which has been soaked in a 2 per cent. solution of the chloride and then thoroughly dried, is packed round the stump. Finally, the end of the stump alone is touched with 100 per cent. solution. The whole is covered with protective silk and carbolised wool, and the antiseptic dressing laid on so that it can be easily lifted.

The space round the stump is kept thoroughly dry by repeated dressing (three or four times daily, according to amount of discharge) with the chloride of zinc wool ; the pedicle is pared away gradually with scissors to diminish its size, to allow the chloride to act more thoroughly, and to prevent pus from burrowing. The elastic ligature is clipped away about the tenth day. The abdominal wall is closed in three parts—the peritoneum with catgut, the aponeurosis and muscle with silk, and the skin with superficial sutures ; the lower angle of the wound (especially when the walls are fatty) is drained, the tube not passing into the peritoneal cavity.

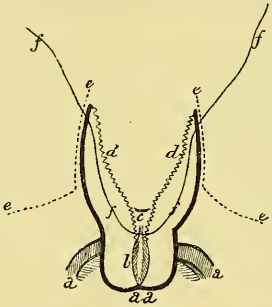

Fig. 263.

Mode of sewing-up stump in extra-peritoneal treatment of pedicle (*Fritsch*).
a vaginal wall, *aa* os externum, *b* cervical canal, *d c d* funnel-shaped raw surface left after excising mucous membrane, *e* peritoneum, *f* suture.

Another method of extra-peritoneal treatment of the pedicle, introduced by Fritsch,[1] does away with clamp or permanent elastic ligature and uses stitching only to control the vessels—as in the intra-peritoneal method.

After the tumour has been brought out through the incision, the upper portion of the latter is closed. The broad ligaments are ligatured in two places and divided between the ligatures, and the elastic ligature applied. After the tumour is cut away the end of the stump is stitched as in fig. 263. The elastic ligature is then removed; and new stitches put in if there is bleeding, the uterine arteries being tied separately when visible. The broad-ligament pedicles are drawn up and stitched to the uterine stump, round which the parietal peritoneum is adapted (fig. 264 *a*). The sutures to close the abdominal wound are then passed, those next the uterine stump being passed through it (fig. 264 *b*).

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[1] *Loc. cit.*

He has had noteworthy success, having performed 19 cases after this method without any deaths.

A similar procedure has been described by Kelly,[1] with the addition that he passes a ligature horizontally through each side of the cervix so as to constrict the uterine arteries.

The pedicle has also been stitched in the abdominal incision so as to be kept extra-peritoneal while the abdominal wall was closed in over it so that it lay buried in the muscle.[2]

In the last edition of this Manual we gave the results of operations for the removal of fibroids generally for nineteen of the leading operators, which showed out of a total of 590 operations a mortality of 32·3 p.c. Such statistics which do not discriminate between the different operations for fibro-myoma (*v.* p. 429) are now felt to be unsatisfactory; to put the removal of a pediculated subserous fibroid alongside of extirpation of the greater portion of the uterus manifestly vitiates statistics. We have made the distinction wherever the material for doing so was furnished in the reports, but in very many cases this could not be done, as will be seen in the following references to the literature of the last three years which deal with those who have recorded ten operations and upwards.

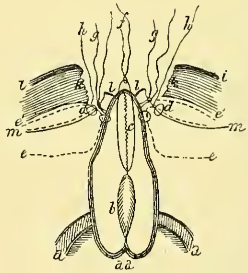

FIG. 264 *a*.

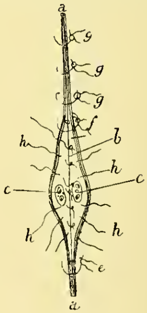

FIG. 264 *b*.

MODE OF SUTURING WALLS AND PERITONEUM ROUND STUMP (*Fritsch*).

a vagina, *b* cervical canal, *c* apposed raw faces of stump, *d* suture uniting parietal peritoneum *é* to stump, *f* suture closing raw surface of stump, *g* suture tying up broad ligament, *h* end of sutures *d*, *i* surface of abdomen, *k* abdominal wound, *l* stump of broad ligaments, *m* their upper margin.

a abdominal wound, *b* stump wound, *c* ends of broad ligaments, *e* lower and *f* upper skin-suture, which keeps stump in position, *g* skin-sutures, *h* sutures uniting peritoneum to stump.

Albert of Vienna has done 12 supra-vaginal amputations with extra-peritoneal treatment of the pedicle, and 8 myomotomies, with only 1 death in the 20 cases.

Bantock in a recently reported series of 100 cases of abdominal section[4] has 15 hysterectomies with 3 deaths, or a mortality of 20 p.c.; but adding the 9 myomotomies in the series, the mortality is reduced to 12·5 p.c.

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[1] *Amer. Jour. Obstet.* 1889, p. 375.

[2] By von Hacker and Rummel. F. N. Schmidt (*Archiv f. Gyn.* Bd. XXXIII., S. 325) records a case treated successfully after this method.

[3] *Centralb. f. Gyn.* Bd. XII., S. 645.

[4] *Lancet*, 1887, I., p. 518.

Braun[1] of Vienna reports on 38 cases of operation for fibroid, with 6 deaths, and is strongly in favour of extra-peritoneal treatment of the stump as both of the cases treated intra-peritoneally died.

Fehling[2] of Stuttgart has done 10 supra-vaginal amputations, with 3 deaths. Taking with these his 4 myomotomies, we have out of the 14 cases, 11 extra-peritoneal with 1 death, and 3 intra-peritoneal with 2 deaths.

Fritsch[3] of Breslau (if we deduct from his sixty-one operations those where the uterine cavity was not cut into) has had twenty intra-peritoneal with 9 deaths, and twenty-seven extra-peritoneal with 3 deaths.

T. Keith,[4] now of London, records 26 operations (one being not for fibroid but for sarcoma), with 4 deaths. Taking along with these his previous series, he has a total of 64 cases with a mortality in hospital (38 cases) of 15·7 p.c. and in private (26 cases) of 3·8 p.c.

Krassowski[5] records 19 cases of operation for fibroids with 8 deaths, viz. 12 extra-peritoneal cases with 6 deaths, and 7 intra-peritoneal with 2 deaths.

Rein[6] of Kiew reports 10 cases of hysterectomy (9 treated intra-peritoneally) with 2 deaths.

Tait[7] of Birmingham, in his second series of 1000 abdominal sections, mentions 88 hysterectomies (including myomotomies) with a mortality of 11·3 p.c.—the last 31 cases being without a death.

Tauffer of Buda-Pesth[8] records 16 cases of hysterectomy for fibroid—8 extra-peritoneal with 2 deaths, and 8 intra-peritoneal with 4 deaths.

Thornton[9] of London says he has operated 88 times for fibro-myoma with 14 deaths, 11 being in the first half and only 3 in the second half of his cases.

Of cases by operators who report no fewer than 10 cases (mostly isolated cases) we have a total of 68 operations with 15 deaths. Of these, 33 were extra-peritoneal with 7 deaths, and 22 intra-peritoneal with 4 deaths; in 13 cases with 4 deaths, it was not specified whether the treatment was extra- or intra-peritoneal. These last particulars are of little value from a statistical view, because the probability is that isolated unfavourable cases are often not recorded.

These results show that the mortality of operations for fibroids is being, under improved methods, distinctly reduced. That it will ever be as low as in ovariotomy is doubtful, because these tumours, though frequent, only exceptionally endanger life and call for operation.

A *fibroid of the cervix* may push its way into the cellular tissue and displace the peritoneum. Such an extra-peritoneal tumour may also be removed by laparotomy.[10]

Sänger[11] reports on two cases of abdominal section for fibroid tumour of the cervix: in one, the pedicle was treated by the elastic ligature and dropped back; in the other, the uterus was amputated and the stump stitched by Zweifel's method (see p. 434) and dropped back. Kelly[12] also cut down on two fibroid tumours of the cervix and removed them with écraseur; no pedicle was tied, but the peritoneal cavity was drained and washed out for some days afterward. Byford[13] has removed a subserous fibroid of the cervix *per vaginam.*

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[1] *Brit. Med. Journ.*, 1888, I., p. 211.

[2] *Centralb. f. Gyn.*, Bd. XI., S. 276.

[3] *Loc. cit.*

[4] *Brit. Med. Jour.*, 1887, II., p. 1257.

[5] *Centralb. f. Gyn.*, Bd. XII., S. 199.

[6] *Centralb. f. Gyn.*, Bd. XII., S. 852.

[7] *Brit. Med. Jour.* 1888, II., p. 1096. He attributes the diminution in his mortality (which was 35·7 p.c. in his former series of 1000 cases) to tying the broad ligaments so as to strip them off the uterus before its amputation.

[8] *Centralb. f. Gyn.* Bd. XII., S. 123.

[9] *Lancet*, 1886, II., p. 212.

[10] As in Thelen's case: *Centralb. f. Gyn.*, 1885, No. 3.

[11] *Centralb. f. Gyn.*, Bd. XIII., S. 207.

[12] *Amer. Jour. Obstet.*, 1886, p. 45.

[13] *Amer. Jour. Obstet.*, 1888, 1205.

c. REMOVAL OF OVARIES OR OF UTERINE APPENDAGES.

The removal of these, as we have seen (*v.* p. 209), usually stops menstruation and induces the menopause. Hence in the case of fibroid tumours this operation does good in two ways—by checking bleeding and stopping the growth of the tumour. The mortality is also low (under 3 p.c.), so that this operation, were it always practicable, would have a wide field in the treatment of myoma. Unfortunately, it is frequently impossible to get at both ovaries in cases of large myoma; while one is to the front and easily accessible, the other is to the back and sometimes low down towards the pouch of Douglas. The technique is the same as that described in Chapter XXI., with the exception that a long abdominal incision is often necessary to allow the operator to pass the whole hand into the abdomen so as to get at the appendages. As to the mortality, the largest series recently published is by Lawson Tait, who had in 148 cases only 3 deaths. The other cases (37) which we have collected from the literature show a mortality of 5·4 p.c.

SUMMARY AS TO OPERATIVE TREATMENT OF FIBROID TUMOURS.

We may sum up the question of the treatment of fibroids, so far as it is known at present, as follows:—

(1.) When polypoid, or submucous and being expelled, treat as recommended in Chap. XXXIX.

(2.) When subperitoneal, if causing no inconvenience, though large, leave them alone.

(3.) When growing rapidly or threatening life from hæmorrhage, and where the patient is not near the menopause, we may operate.

(*a.*) We may remove the uterine appendages if they are accessible. It should be kept in mind that it is sometimes very difficult, or even impossible, to do so.

(*b.*) Abdominal section and extra-peritoneal treatment of the pedicle by clamp or serre-nœud or stitching gives the best results.

CHAPTER XXXVIII.

FIBRO-CYSTIC TUMOUR OF THE UTERUS.

LITERATURE.

Atlee—Ovarian Tumours: Philadelphia, 1873. *Beates*—Cystic leiomyoma of Uterus: Am. Journ. of Obstet., 1884, p. 753. *De Sinéty*—Manuel de Gynécologie, Paris, 1879, p. 413. *Diesterweg*—Ein Fall von cysto-fibroma verum: Zts. f. Geb. und Gyn. IX., S. 191. *Grasskopff*—Zur Kentniss der Cystomyome des Uterus: Munich, 1884. *Gusserow*—Neubildungen, etc.: Stuttgart, 1885, S. 117. *Heer*—Ueber Fibrocysten des Uterus: Zurich, 1874. *Leopold and Fehling*—Ein Beitrag zur Lehre von den kystischen Myomen des Uterus (Myosarcoma lymphangiektodes uteri): Archiv für Gyn., Bd. VII., S. 531. *Peaslee*—Ovarian Tumours: London, 1873. *Rein*—Beitrag zur Lehre von den lymphangiectatischen Fibromyomen des Uterus in pathologisch-anatomischer und klinischer Beziehung: Archiv f. Gyn., IX., S. 414. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 213: Leipzig, 1878. *Sir Spencer Wells*—Ovarian and Uterine Tumours: London, 1883. *Spiegelberg*—Die Diagnose der cystischen Myome des Uterus und ihre intraperitoneale Ausschälung, eine neue Operationsmethode derselben: Archiv f. Gyn., VI., S. 341. *Thomas*—Diseases of Women, p. 551: London, 1882.

SYNONYM—Cysto-fibroma.

Attention has been directed only of recent years to this, the rarest form of uterine tumour. Its pathology is now being worked out, and at present we group under this head tumours which may afterwards be shown to be anatomically separable. Since ovariotomy has come to be extensively practised, they have derived clinical importance from their close resemblance to ovarian tumours.

PATHOLOGY.

The majority of fibro-cystic tumours are simply fibroid tumours which have become softened. The spaces between the bundles of fibrous tissue open out and contain serum; the trabeculæ between adjoining spaces give way, which allows these to run together to form larger cavities. Fig. 265 shows this in a *subserous fibroid*, which form most frequently undergoes this change.

The term "cystic," is, it is evident, misleading as applied to this form of tumour. The cavities are not "cysts," that is, they do not possess a special wall.

Lymphatic origin.

Kœberlé was the first to suggest that some forms of fibro-cystic tumour might be due to *dilated lymphatics*. Leopold and Fehling have carefully described a case in which the cavities were lined with endothelium. The fluid from these cavities was of a clear yellow colour, *and coagulated* as soon as it was exposed to the air; fibrin was present in it. To this form the name of *Fibromyoma lymphangiektodes* has been given. Müller[1] has also described recently a preparation in which he found the epithelial lining present in the smaller cysts. Atlee says this coagulation of the fluid—formation of colourless blood-clot—is diagnostic of the fluid from *all* fibro-cystic tumours, and may be relied on to distinguish them from ovarian. Spiegelberg records a case in which this spontaneous coagulation of the fluid was observed, but the most careful microscopic examination could detect no epithelial lining of

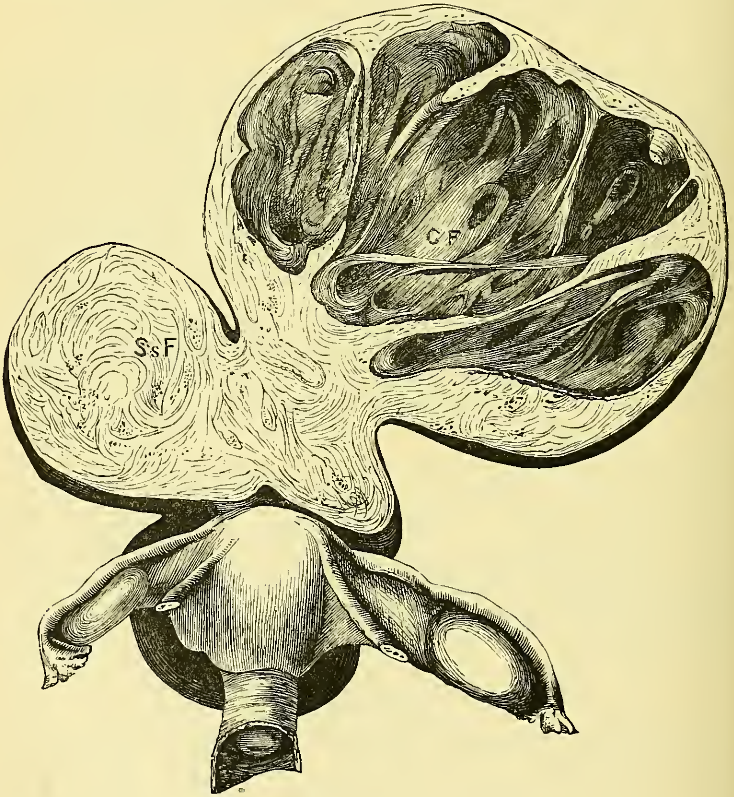

Fig. 265.

Large Three-lobed Fibroid springing from the Fundus by a somewhat thin pedicle, of which CF is cystic, while SsF and the dark shaded mass behind the uterus are subserous. This along with two smaller fibroids growing from the posterior surface of the uterus was removed by Laparotomy (*Schroeder*).

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[1] Beitrag zur kenntniss der cystoiden Uterustumoren: *Archiv f. Gyn.*, Bd. XXX., S. 249.

the cavities. A transition case has been described by Rein, in which the cavities were not themselves lined with endothelium but *communicated* directly with the lymphatic spaces.

Mucoid Degeneration.

Mucoid degeneration of a fibroid tumour has been described by Virchow as Myxomyoma. In this case the interstitial tissue contained fluid rich in mucin and with numerous nucleated round cells.

Sarcomatous degeneration of a fibroid[1] apparently also produces a cystic condition of a fibroid tumour although this is not a true fibro-cystic tumour.

Cysts with an epithelial lining have been described by Babesin and Diesterweg. The latter removed on two occasions (with two years' interval) a submucous polypus with cysts; the cavities were lined with ciliated epithelium and contained thin brownish blood. Baer on cutting through a similar polypus with the écraseur was afraid that he had cut through the peritoneal cup of an inverted uterus, as the appearance of the section of the cyst resembled it.

SYMPTOMS.

These are the same as those of fibroid tumours, except that their increase in size is rapid. As they are usually subserous, menorrhagia is not often present.

DIAGNOSIS; DIFFERENTIAL DIAGNOSIS.

Their diagnosis is often difficult, as the difference in consistence between the more solid and the fluid parts may escape detection. The most important point to make out is *the relation to the uterus*, and the *displacement* of the latter which is produced. To ascertain its connection with the uterus, we make the examination per rectum: to do this thoroughly, it may be necessary to anæsthetise the patient and to introduce two fingers; the uterus is at the same time drawn down with the volsella. As to the displacement of the uterus, it is elevated towards the abdomen; with an ovarian tumour, it is depressed to the front or to the back. The sound is now passed; if the uterine cavity is increased in size, and more especially if the movement of the tumour by an assistant is immediately communicated to the sound, the tumour is probably uterine.

Differential Diagnosis.—Their diagnosis *from ovarian tumours* is the most important and, at the same time, the most difficult. As in the majority of cases they are merely altered fibroid tumours, their differentiation *from a simple fibroid* is merely a matter of degree of softness. In a case described by Beates as one of Cystic Leio-myoma of the uterus, the patient had been tapped twice; and as the fluid gave the ovarian cell described by Drysdale (*v.* p. 222), the case was set down as undoubtedly one of ovarian tumours. The differential diagnosis from ovarian tumour is often not made till the abdomen is opened.

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[1] As in Fenger's case (*Amer. Jour. Obstet.*, 1888, p. 1200), and probably also Erich's (*ibid.* 1886, p. 517).

TREATMENT.

The treatment consists in removal through the abdominal walls, according to the method described for fibroid tumours (*v.* p. 430). References to recent cases of Laparotomy for Fibro-cystic tumours by Boldt, Byford, Dawson, Harsha, Marta, Morris, Müller, Negri, O'Hara, Plimmor, Swiecicki, Lawson Tait, Walter, Wilson, and Wylie, will be found in the Index of Recent Gynecological Literature.

Morris'[1] case has this special interest that it was a second case of operation, a fibro-cystic tumour having been removed from the same uterus eight years previously.

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[1] *Lancet*, 1888, I., 973.

CHAPTER XXXIX.

POLYPI OF THE UTERUS.

LITERATURE.

Barnes—Diseases of Women, p. 195: London, 1878. *De Sinéty*—Manuel pratique de Gynécologie, p. 419: Paris, 1879. *Gusserow*—Die Neubildungen des Uterus, Billroth's Handbuch, S. 179: Stuttgart, 1885. *Hegar und Kaltenbach*—Die operative Gynäkologie, S. 473: Stuttgart, 1881. *Hicks, Braxton*—Three cases of very large polypi of the uterus, etc.: Obstet. Journ. of Great Brit., Jan. 1879. *Küstner*—Notiz zur Metamorphose des Uterusepithels: Centralblatt f. Gyn. 1884, p. 321. *Matthews Duncan*—Edin. Med. Journ. July 1871; and Obstet. Journ. 1873, p. 497. *Simpson, Sir J. Y.*—Diseases of Women, p. 704: Edin. 1872. *Thomas*—Diseases of Women: London, 1880, p. 558. *Underhill*—On the Structure of three cervical Polypi, and the Structure of a true mucous Polypus of the Cervix: Edin. Obst. Soc. Trans., Vol. IV., pp. 231 and 241.

By the term "Polypus" is understood a pediculated tumour attached to the mucous membrane of the uterus. It includes the following tumours, which are anatomically distinct:—

1. Submucous fibroids, which have become pediculated and are in process of extrusion;
2. Mucous polypi and adenoma;
3. Pediculated cystic follicles;
4. Placental polypi;
5. Papilloma of the cervix.

For clinical reasons, it is convenient to use the term polypus in its general sense as implying an external form alone; the symptoms produced by these tumours resemble one another, and their exact nature is sometimes not made out till they are removed. Pathologically, the term should be limited to mucous polypi. It is confusing to speak of a fibroid tumour which has a broad base of attachment as a submucous fibroid, and of one which has a pedicle as a fibrous polypus. The polypoidal projections formed by pediculated ovula Nabothii are only pediculated retention cysts. Placental polypi are not true new-formations.

Pediculated Submucous Fibroids.

1. *Pediculated submucous fibroid tumours* form the so-called "fibrous polypi." They spring from the *muscular* wall of the uterus, usually from the *body* which, as we have seen, is more commonly the seat of fibroid tumours than the cervix. They are of *firm* consistence, of a size varying from a goose's egg and upwards, and are of a rounded or pyriform shape (fig. 266), sometimes elongated and constricted through the pressure

of the uterine walls (fig. 248); the surface is smooth or marked with furrows corresponding to the fasciculi of fibrous tissue.

Sometimes they are of such a size [1] that, although lying in the vagina, they fill the pelvis and press on the bladder and rectum; the uterus is then raised above the pelvic brim (just as it is elevated when the vagina is distended with fluid), and is felt as a smaller body riding on the top of the tumour. Adhesions may form between the surface of the fibroid and the vagina, producing the impression that the tumour springs from the vaginal mucous membrane. [2]

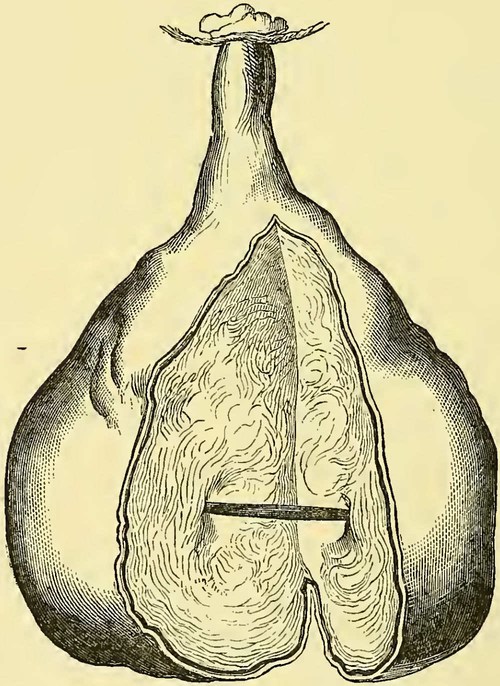

Fig. 266.

Fibrous Polypus laid open to show its identity in structure with a Fibroid Tumour (*Sir J. Y. Simpson*).

The pedicle consists of a narrowing of the calibre of the tumour towards its base of attachment, or of a distinct stalk which may be long enough to allow the fibroid to lie at the vulva. As fibroid tumours are sparingly vascular, the pedicle does not as a rule contain large vessels. When a pediculated submucous fibroid lies in the cavity of the uterus, it sets up uterine contractions which lead to its expulsion; there is a stage at which it lies partly within the uterus (fig. 267), partly in the vagina (the portion constricted by the cervix has been mistaken for a pedicle, and only the lower lobe of the hour-glass tumour removed); finally, the whole tumour lies in the vagina but still maintains its connection with the uterus through its pedicle (fig. 268). The congestion of the fibroid excites uterine contractions, specially at the menstrual period, and thus favours its expulsion. At those times only, we may have the cervical canal temporarily dilated and the polypus projecting through it; after the period, the contractions pass off and the polypus is retracted into the uterine cavity. This condition is fully described by French writers under the name of "polypes à apparations intermittentes." Its practical importance is that we should examine sometimes at the men-

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[1] Koeberlé removed one weighing over 1½ lbs. (*Centralb. f. Gyn.* 1889, S. 263).

[2] Braxton Hicks—*Loc. cit.*

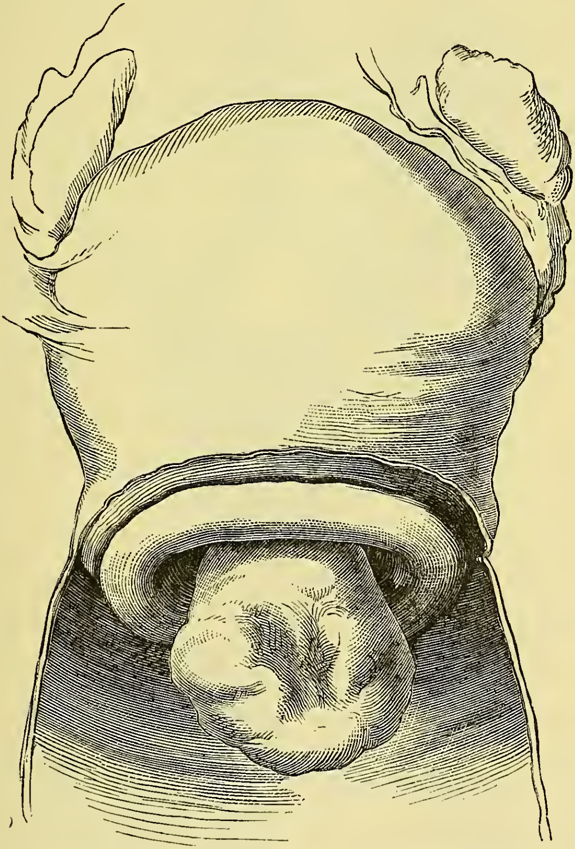

FIG. 267.
INTRA-UTERINE SUBMUCOUS FIBROID WHICH IS BECOMING VAGINAL (*Sir J. Y. Simpson*).

strual period, when a polypus (not recognisable at other times) may be felt through a dilated cervix.

They have the microscopic structure described at p. 404 (*v.* fig. 266).

Mucous Polypi.

2. *Mucous polypi* are developed from the *mucous membrane* of the uterus, most frequently from that of *the cervix.* They are of *soft* pulpy consistence, of about the size of an almond—rarely larger—and have a flattened form; usually, there are more than one present (fig. 269). They are extremely vascular and have the microscopic structure of the mucous membrane from which they are developed.

The typical cervical polypus has the structure seen at fig. 270; the student should compare this with the section of the normal mucous membrane given at p. 20. From the fact that the gland-ducts appear as channels on the surface, it was described by Oldham as the "channelled polypus." Sometimes the polypus shows also the stratified epithelium of the vaginal aspect of the cervix, as in a specimen described by Underhill; he supposes that in this case it sprang from the margin of the os externum: he describes also a polypus which sprang from the *vaginal aspect* and showed only the stratified epithelium. Küstner has shown that stratified epithelium may be found on mucous polypi which have grown high up in the cervical canal; this is another example of how the single-layered uterine epithelium may become changed into stratified epithelium (*cf.* Zeller's Observations, p. 318). These polypi sometimes form the

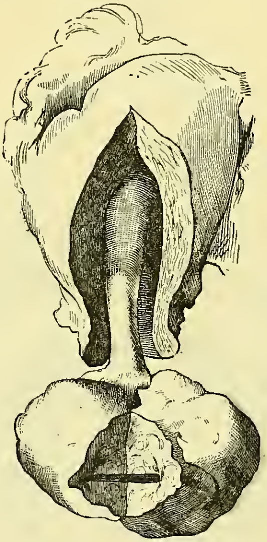

Fig. 268.

Submucous Fibroid which has come to lie wholly in the vagina (*Sir J. Y. Simpson*) starting-point of malignant disease; Underhill traced the commencement of sarcomatous formation in one case.

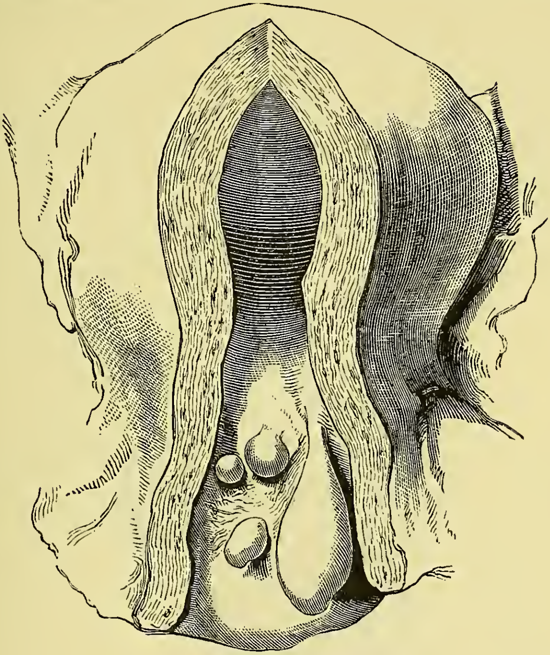

FIG. 269.
GROUP OF MUCOUS POLYPI GROWING IN THE CERVIX UTERI (*Sir J. Y. Simpson*).

De Sinéty divides them into two groups according as they spring (1) from the cervix, (2) from the body of the uterus. Each has the characteristic epithelium (see p. 19) lining the ducts and cysts; the

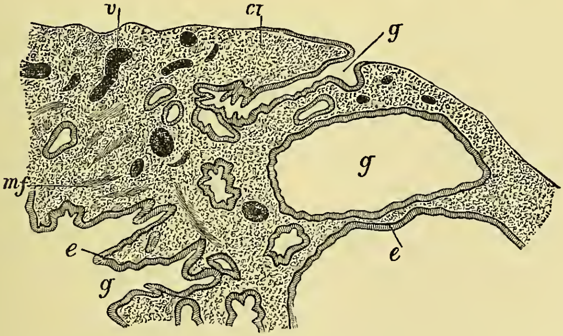

FIG. 270.
SECTION OF A MUCOUS POLYPUS OF THE CERVIX $\frac{40}{1}$. *g* dilated glands, *e* epithelium, *mf* muscular fibre, *v* blood-vessel, *ct* connective tissue (*De Sinéty*).

former have the columnar non-ciliated epithelium of the cervix, the latter the ciliated cylindrical epithelium of the body.

A localised hypertrophy of the glands of the uterus has been described by Schroeder as adenoma polyposum; the changes resemble those of glandular endometritis (*v.* p. 316).

Williams, in his recent monograph,[1] describes four cases of adenoma of the cervix, two being simple villous growths and two being malignant.

3. *Pediculated Nabothian follicles* have been already described under cervical catarrh (p. 306).

Placental Polypi.

4. *Placental or fibrinous polypi.* These are produced as the result of incomplete detachment of the placenta; in some cases we can trace placental villi in their structure. On the surface of this irregularity of the mucous membrane, blood coagulates; and thus the fragment of placenta grows larger through being coated with fibrin. This increase in size may go on until the polypus is the size of an egg. This form of polypus is not a new formation and only finds a place here on account of its polypoidal form. When it sets up a fœtid discharge and the patient becomes cachectic, it may simulate malignant disease of the uterus.[2] After an abortion,[3] they may form in the same way: a piece of decidua left in the uterus maintains its structure and vitality and nutritive connection with the tissues below.

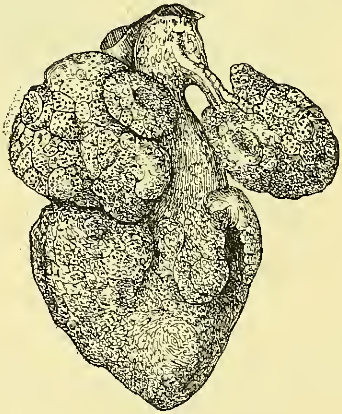

FIG. 271.
NON-MALIGNANT PAPILLOMA OR FIBROMA PAPILLARE OF CERVIX (*Ackermann*).

5. *Papilloma of the cervix.* Simple papilloma of the cervix is a very rare form of tumour; the great proportion of papillary tumours found

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[1] Cancer of the Uterus: London, 1888, pp. 40-44.
[2] As in the case reported by Baer: *Am. Journ. of Obstet.* 1885, 192.
[3] Küstner—Beiträge zur Lehre von der Endometritis: Jena, 1883.

here are malignant (carcinomatous or sarcomatous). Fig. 271 shows such a tumour, described by Ackermann,[1] which sprang from the anterior lip of the cervix. It consisted of a branching stem of connective tissue, with papillæ covered mostly with squamous but in some places with a single layer of cylindrical epithelium. There was no recurrence after removal. The term "cauliflower" excrescence, introduced by Clarke, describes very well the appearance of these tumours. Virchow has shown that in many of these papillomata we find proliferation of the epithelium, and that they form the first stage of epithelial cancer of the cervix (*v.* p. 464); we must therefore regard the cauliflower excrescence as, in the great proportion of cases, a malignant tumour.

SYMPTOMS.

These are Hæmorrhage,
Leucorrhœa,
Dysmenorrhœal pains,
Sterility,
Irritation and discomfort.

Hæmorrhage.

The *hæmorrhage* shows itself first as an increase of the ordinary menstrual flow; afterwards, it comes at irregular intervals. In the case of a submucous fibroid, it comes from the uterine mucous membrane which is hypertrophied. In the mucous polypus, it comes from the tumour itself which is vascular and bleeds easily; when the polypus protrudes through the cervix, there may be hæmorrhage[2] (*v.* the preparation represented at fig. 94). In other cases the drain of blood, though not directly fatal, may produce profound anæmia; hence the importance of ascertaining and removing the cause of the hæmorrhage. The cachectic appearance of the patient, thus induced, may be such as to lead us to form a strong prepossession in favour of the existence of malignant disease before we proceed to physical examination.

Leucorrhœa.

The *leucorrhœa* is due to the endometritis which is always present. The polypoidal retention cysts are the result of a chronic catarrh of the cervix or uterus. It is disputed whether mucous polypi are the cause or the result of the inflammatory changes; De Sinéty inclines to the latter view. When the polypus comes to lie in the vagina, it produces an irritating vaginal leucorrhœa.

Dysmenorrhœal Pains.

The *dysmenorrhœal pains* are due to the muscular efforts of the uterus to expel the polypus, and are most marked when the polypus has descended to the os internum or lies in the cervical canal.

In rare cases the presence of the foreign body in the uterus has produced the sympathetic phenomena of pregnancy—pigmentation of the breasts and abdomen and morning sickness.

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[1] *Virchow's Archiv:* Bd. XLIII. S. 88.

[2] Barnes records the case of a woman of twenty-six years of age in which a polypus the size of a walnut produced a fatal hæmorrhage.

Sterility.

Sterility is occasioned by the mechanical obstruction of the polypus, either in the cervical canal or at the entrance to the Fallopian tubes. The obstruction in one case was not sufficient to prevent the spermatozoa from passing upwards, but hindered the entrance of the fertilised ovum into the uterine cavity and thus produced Fallopian-tube gestation.

A pediculated fibroid may form a serious complication to labour, in preventing the progress of the child's head; such a polypus has been laid hold of with the forceps under the impression that it was the presenting head. They may also give rise to hæmorrhage in the puerperium.[1]

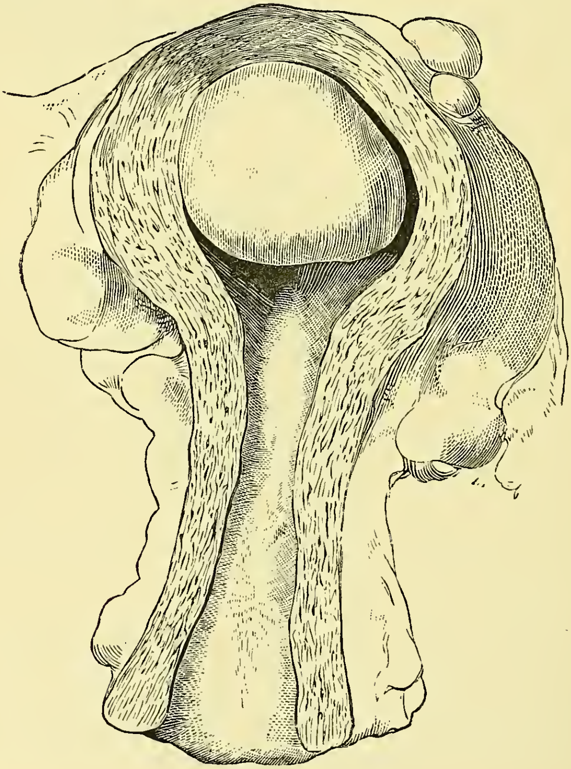

FIG. 272.
PEDICULATED SUBMUCOUS FIBROID, springing from the fundus, which has not dilated the cervical canal (*Sir J. Y. Simpson*).

DIAGNOSIS.

1. *When the polypus has dilated the os externum*, it will be recognised by the finger per vaginam. If it be larger than a walnut and of firm consistence, and if the uterine cavity be increased in length, it is a

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[1] See paper by Halliday Croom on Fibrous Polypi complicating the puerperium: *Edin. Med. Journ.* XXXII. I., p. 289.

pediculated fibroid tumour. If it be small and of a pulpy consistence, it is a true mucous polypus; mucous polypi do not, as a rule, produce hypertrophy of the uterus.

Having learned that there is a pediculated body in the vagina or cervical canal, carry the finger upwards to ascertain its point of attachment; if this be high up in the uterine cavity the tumour is a pediculated fibroid; if it springs from the cervical mucous membrane, it is probably a mucous polypus.

On bimanual examination, the uterus is found to be enlarged in the case of pediculated fibroids; it is not enlarged with mucous polypi, unless from associated chronic metritis.

The speculum shows that the surface of the true mucous polypus has a bright cherry-red colour, which contrasts with the darker red of the cervical mucous membrane embracing it. The appearance of the fibroid tumour depends on the condition of the investing mucous membrane which is often ulcerated or sloughing; when the capsule has given way, the fibrous substance of the tumour is seen to be of a paler colour.

2. *When the uterus is enlarged but the os externum not dilated*, the diagnosis is more difficult (fig. 272). If the uterus be markedly enlarged and of firm consistence and (the possibility of pregnancy being excluded) the sound pass for 4 or 5 inches, there is probably a submucous fibroid tumour. It is difficult to determine whether it is pediculated or not. We endeavour first to pass the sound round the tumour or upwards on different sides of it. Fig. 253 shows how the sound passes in a case of a pediculated tumour attached to the fundus. The sound must be used with care as its use is not unattended with risk; laceration of the mucous membrane, with the introduction of septic matter, has resulted from too free and repeated exploration in this way. Dilatation of the cervix and exploration with the finger are sometimes necessary to ascertain whether the fibroid be pediculated and to what part of the uterus it is attached.

3. *When the uterus is not much enlarged*, the diagnosis is very difficult. The possibility of a fibroid tumour is excluded. A small mucous polypus, however, may exist in the uterine cavity and escape detection with the sound. In such a case, it is recognised only on dilating the cervix and exploring the uterine cavity with the finger.

The *curette* is a valuable aid to diagnosis when the actual exploration of the uterine cavity with the finger is not desirable. By its use we diagnose and treat the case at the same time. Thus irregularity of the uterine surface (which is easily detected by the curette) and the character of the scrapings removed, may show that we have to do with pediculated retention cysts or placental polypi.

DIFFERENTIAL DIAGNOSIS.

The characters which distinguish a pediculated fibroid from a mucous polypus are its larger size, firmer consistence, and its springing from the body of the uterus. The uterine cavity is increased in size. We probably find, also, other fibroid tumours interstitial or subserous.

A pediculated fibroid hanging down into the vagina, may readily be mistaken for the inverted fundus uteri; this is most likely to happen when there is much hæmorrhage from the former, and when concomitant pelvic inflammation makes examination difficult. A true diagnosis here is all-important, as removal of the fibroid may save the patient's life; while amputation of the uterus, under the supposition that it was a fibroid, might lead to disastrous consequences. The preparation shown at fig. 273 is interesting in this connection. The case had been sent into hospital as one of inverted uterus. It is evident how the form of

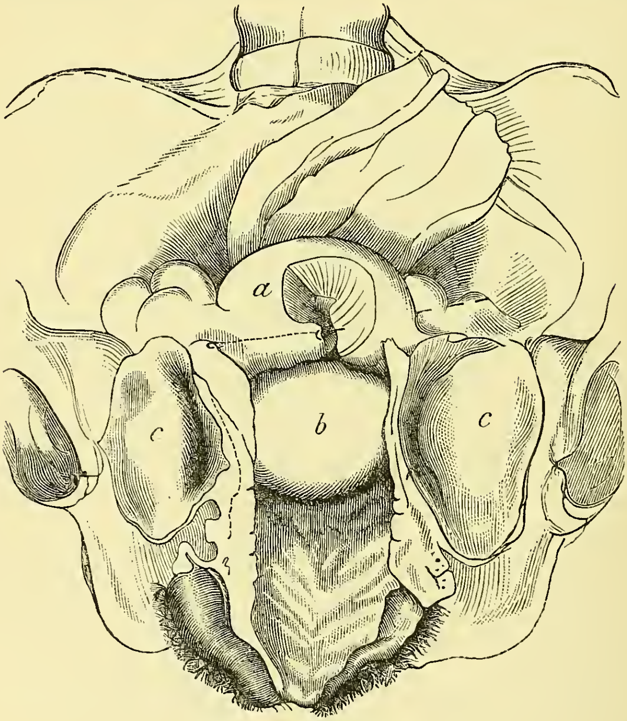

Fig. 273.

a, Uterus with a portion of the anterior wall cut out; *b*, pediculated fibroid attached to back wall immediately above os internum. The front of the bony pelvis has been removed; *cc*, halves of divided bladder (*A. R. Simpson*).

the tumour in the vagina and the fact that it bled freely, would in the absence of further examination lead to this mistake.

Given a tumour the size of a pear hanging down through the cervical canal into the vagina, we wish to make sure that it is not the inverted body. First, sweep the finger carefully round the neck and note whether the mucous membrane of the cervical canal is reflected on to the neck of the tumour; sometimes inflammatory adhesions round the neck produce a condition simulating inversion. Now make the Bimanual; if the body in the vagina be a fibroid, the uterus will be in its normal place. The abdomino-vaginal examination is often difficult on account of the body in the vagina; therefore pass the finger into the rectum, through the anterior wall of which we can distinctly feel whether the cervix has a truncated end above (inversion) or passes up into the body of the uterus (fibroid); the abdomino-rectal makes this more evident. When examination is difficult and the diagnosis doubtful, we should not hesitate to give chloroform and make a thorough examination; it is well to be prepared to operate at the same time, if necessary.

Finally use the sound, which is an important test. Sweep the finger carefully round the neck of the tumour and feel for a depression corresponding to the os, into which endeavour to introduce the sound. If it passes for two and a half inches or more and is then arrested, it is probably in the uterine cavity; make sure of this by pressure with the hand on the abdomimal wall, or per rectum.

When the tumour in the vagina fills the pelvis or rides above the brim, so that the finger cannot reach the pedicle or feel whether the os is present, the diagnosis is very difficult. We rely on careful abdominal palpation to ascertain whether the uterus can be felt resting on the top of the tumour.

We must not forget that we may have both conditions present, *i.e.*, pediculated fibroid + a certain amount of inversion.

PROGNOSIS.

The prognosis as to *danger to life* will depend on the hæmorrhage. Wherever a polypus is present, we should advise its removal.

As to *the operation*, the removal of mucous polypi and smaller fibroids is safe and easy. The fear of hæmorrhage from the pedicle of a fibroid tumour, which led to the treatment by ligature, has been found by experience to have been exaggerated. Where there is a rigid cervix to be dilated before we can remove the tumour, where the tumour is large so that it must be removed in portions, where there is a thick pedicle and consequently a larger raw surface, the operation will be a more serious one and the prognosis given more guardedly.

Should there be pregnancy, the polypus may be removed without interrupting its course. If it be of such a size as to interfere with labour, it should be removed as soon as discovered.

TREATMENT.

Whenever it is necessary to dilate the cervix for diagnosis, we should have instruments ready to remove the tumour at the same time. The dilatation is effected by laminaria tents, or by Tait's graduated dilators. A good method is to place a laminaria tent in the cervix to start the dilatation; after six or eight hours chloroform the patient, fix the cervix with volsellæ, and introduce the graduated dilators in succession till the cervical canal is wide enough to admit the index finger; remove the polypus by the means to be described; wash out the uterine cavity with 1 to 60 carbolic solution.

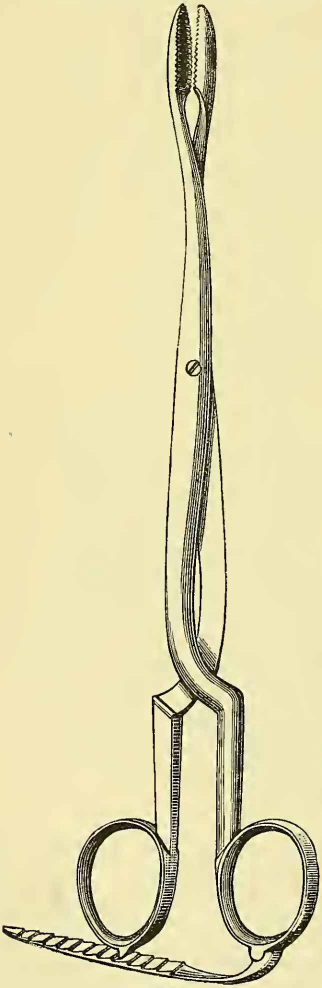

Fig. 274.
Forceps with catch for removing Mucous Polypi.

Small *polypoidal projections* are removed with the curette, as described under Endometritis, followed by the application of carbolic acid.

Mucous polypi are twisted off with the forceps, shown at fig. 274. It is advantageous to use forceps with a catch, as this keeps a steady hold of the tumour and leaves the operator's fingers free to twist the forceps round.

In removing *fibroids*, we first ascertain the seat of insertion and size of the pedicle. When the tumour is small, we can learn this by the fingers; when so large that we cannot get the fingers past the tumour to the pedicle, we probe round its base with the sound or, laying hold of the tumour with forceps, endeavour to rotate it and thus test the thickness of the pedicle.

The pedicle will yield to torsion with the forceps. This is the simplest method and should always be tried in the first instance; the forceps shown at fig. 257, or a pair of Nélaton's forceps (fig. 141), are most suitable. If this fail, divide the pedicle with curved scissors. Make traction with the forceps to render the pedicle tense; too forcible traction might produce inversion. Guarding the uterine wall with the fingers, carry in the curved scissors. In cutting, make the scissors hug the surface of the tumour and thus keep clear of the uterine wall. Strangulation by ligature, formerly widely practised, is now entirely abandoned; the sloughing stump was a fruitful source of septicæmia.

When the pedicle is of considerable thickness, it may be divided with the écraseur or with the galvano-caustic wire. The wire écraseur is preferable to the chain écraseur, as it is more easily applied. For the nature and method of use of the écraseur, the student is referred to Treatment of Carcinoma of the Cervix.

When the size of the tumour makes the pedicle inaccessible, it must be diminished. This is best effected by Hegar's method: traction is made on the tumour, which is at the same time incised in a spiral manner with scissors; the tumour is thus (as it were) unwound, till finally the pedicle is reached and divided.

Chloroform is not necessary for the removal of smaller polypi. The section of the pedicle is painless; if pain be present on tightening the écraseur round the neck of a polypus, the operator should examine carefully again to make sure that the wire is not constricting the inverted fundus. Where the polypus is large and the operation tedious, it is better to have the patient anæsthetised as the operator has then more freedom.

CHAPTER XL.

CARCINOMA UTERI (OF CERVIX): PATHOLOGY AND ETIOLOGY.

LITERATURE.

Barbour—Cases of Carcinoma of the Female Pelvic Organs: Edin. Med. Jour., July 1880. *Barnes*—Diseases of Women, p. 821: London, 1878. *Gusserow*—Die Neubildungen des Uterus, S. 199: Stuttgart, 1885. Ueber Carcinoma uteri, Volkmann's Samml. klin. Vor., N. 18. *Ruge and Veit*—Zur Pathologie der Vaginalportion: Stuttgart, 1878. Der Krebs der Gebärmutter: Stuttgart, 1881. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 264: Leipzig, 1878. *Simpson, Sir J. Y.*—Diseases of Women: Edinburgh, 1872, p. 140. *Tanner*—On Cancer of Female Sexual Organs: London, 1863. *Virchow*—Ueber Cancroide und Papillargeschwülste, 1850. *Williams*—Cancer of the Uterus: London, 1888. The student will find the fullest references to literature in Gusserow's and Ruge's.

Thus far we have considered only the simple or benign tumours in the uterus. We pass now to the malignant; and these present themselves in three forms—Malignant Adenoma, Carcinoma, and Sarcoma. The first two differ from the third in that, while they are of an epithelial, it is of a connective-tissue type. And the first two differ between themselves in that the one builds itself on the plan of the uterine glands, the new-formed tissue being a reproduction of the branching cervical glands or the tubular glands of the body of the uterus, while the other produces epithelium in an irregular manner in clusters and strings embedded in a proliferating connective tissue. The former type of growth is rare in malignant tumours of the uterus, and our knowledge of it as yet scanty; so that, although we shall have occasion to refer to malignant adenoma, we do not describe it as a separate variety of tumour.

The cervix, as we have seen, differs anatomically from the body of the uterus; it also differs pathologically, *i.e.* is distinctly marked off from the body of the uterus as regards some of the morbid processes to which it is liable. We have seen that while the body of the uterus is the common seat of fibroid tumours, the cervix is rarely so; in cancer the opposite condition obtains, for the body is rarely, while the cervix is very often, attacked by it. When cancer of the uterus is spoken of, it is in fact almost always cancer of the cervix that is meant; and it is the latter that we have chiefly to consider here, for only about 2 p.c. of cases of cancer are in the body, the remaining 98 p.c. being in the cervix.

PATHOLOGY.

On no subject in pathology has more been written and a greater variety of opinion expressed than on carcinoma. We have endeavoured to arrange, in the table on the following page, the facts most important for the student to know.

CLASSIFICATION.

There are three varieties of carcinoma usually given in the English text-books. These are medullary (encephaloid) and scirrhous cancer, and epithelioma. Now the distinction between the first two is merely a question of degree; in the former the cellular element, in the latter the fibrous stroma is in excess. When we say that medullary cancer is frequent but scirrhous rare, we only mean that carcinoma runs a rapid course when it occurs in the uterus. The distinction between these two and epithelioma is more marked and is therefore given in the table, but it is very doubtful whether it rests on a pathological basis.

From the above it is evident that we are not yet in a position to make a scientific classification. The division according to clinical features into *true carcinoma* and *cancroid* (καρκίνος and εἶδος, *like cancer*) is convenient: it expresses nothing more than that in some cases progress is more rapid than in others; and that the disease in the one case produces metastatic deposits, in the other remains local.

ORIGIN.

Virchow's View.

View of Thiersch and Waldeyer.

As regards the origin, there are two distinct views. That the disease arises from *connective-tissue cells alone*, is the view maintained by Virchow and his followers; while Thiersch and Waldeyer hold that in *all cases* it originates in *epithelial cells*. In the cervix, as possible sources, there are two varieties of epithelium; the squamous on the vaginal aspect, the cubical lining the canal. In the *flat* cancroid of the cervical canal, it arises from the cubical epithelium which lines the latter; in the papillary form, it originates in the cells of the rete Malpighi on its outer aspect (*Klebs*). It will be seen that Waldeyer holds the view that, in all cases, it arises from the latter only.

Ruge and Veit's Investigations.

More recent investigations into the origin of carcinoma are by Ruge and Veit. According to them carcinoma arises, in the majority of cases, from a transformation of the connective-tissue cells; even the papillary form which produces the so-called cauliflower excrescence, although it apparently springs from the epithelium, is developed from the connective-tissue cells. The connective-tissue stroma becomes vascular and almost like granulation tissue. The young cells, which are apparently produced from the connective-tissue corpuscles, take on an epithelial character. These observers never saw plugs of epithelium extending downwards into the connective tissue.

Classification according to Clinical Features.	Forms.	Origin.	Position.	Progress.	
CARCINOMA progresses rapidly; produces metastasis, affects connective tissue rapidly.		from the cervical epithelium of constricted cervical glands (*Klebs*); from plugs of the deepest layers of squamous epithelium on the vaginal aspect of cervix (*Waldeyer*); from connective-tissue cells of cervix (*Virchow*).	in substance of cervix.	produces thickening, then ulceration;	When ulceration and breaking down have been produced, these forms are no longer distinguishable.
EPITHELIOMA OR CANCROID progresses slowly; does not produce metastasis; spreads by extension.	flat (flache cancroid)	from the cubical epithelium of cervical canal (*Klebs*); from plugs of the deepest layers of squamous epithelium on vaginal aspect of cervix (*Waldeyer*).	superficial within cervical canal.	excavates cervix;	
	papillary	from the deepest layers of squamous epithelium on vaginal aspect of cervix (*Klebs and Waldeyer*); from connective-tissue cells (*Ruge and Veit*).	superficial outside of cervix.	spreads downwards into vagina (cauliflower excrescence).	

Williams, on the other hand, in figuring a specimen like one by Ruge and Veit, says that the hypertrophied connective-tissue papillæ pushing their way through the proliferating cancerous epithelium (the superficial living layers of which are shed in places) produce only an appearance of their being the starting-point of the disease.

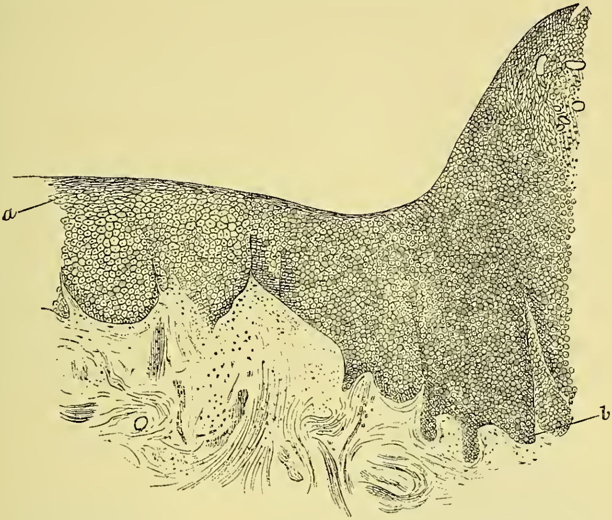

Fig. 275.

Cancer of the Vaginal Portion (*J. Williams*).
a. Normal squamous epithelium in the vaginal aspect of the cervix ; *b.* processes of cancerous cells which have developed from it.

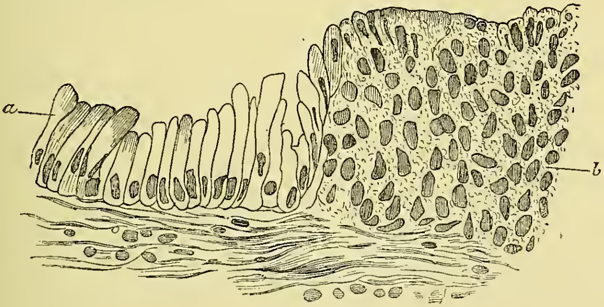

Fig. 275.*

Cancer of the Cervix Proper (*J. Williams*).
a. Normal columnar epithelium lining a gland within the cervical canal ; *b.* cancerous cells derived immediately from it.

According to the place in the cervix in which it begins, we distinguish Cancer of the Vaginal Portion from Cancer of the Cervix proper—an important distinction which we owe to Ruge and Veit. It is difficult to draw an imaginary line which would divide the cervix into these two parts; but if we hold to an exclusively epithelial origin for cancer, we can define the former as cancer beginning in the *squamous* epithelium on the vaginal aspect, the latter as cancer beginning in the *columnar* epithelium lining the canal. Figs. 275 and 275* illustrate the origin of cancer-cells from these two sources. Cancer of the vaginal portion is the rarer of the two forms.[1]

POSITION.

Three positions in Cervix.

There are apparently three places in the cervix where carcinoma may develop. (1.) It may begin as hard *nodules in the substance of the cervix* underneath the mucous membrane; these increase in size, come to the surface of the mucous membrane (fig. 276), and produce ulceration. (2.) More rarely does it commence in the *interior of the cervical canal* and spread along its mucous membrane so as to excavate the canal. (3.) It may appear *on the vaginal aspect of the cervix* as an ulcerating surface (fig. 278) or as an irregular papillary tumour, which, extending downwards into the vagina, attains considerable size.

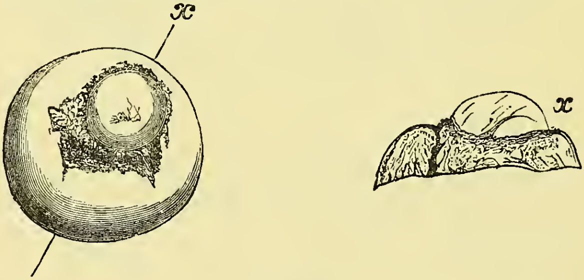

FIG. 276.

CARCINOMATOUS NODULE GROWING IN ONE LIP OF THE CERVIX AND PUSHING THE MUCOUS MEMBRANE OUTWARDS. The figure to the right is a section of the cervix made through the line *x* (*Schroeder*).

Form of Slow Ulceration not malignant.

It is important to remember that there is a form of slow ulceration on the surface of the vaginal portion which is not malignant. John Williams[2] described this as "corroding ulcer of the os uteri:" it begins at the os and extends symmetrically downwards into the vagina, without hard or thickened edges, extending by simple ulceration or the formation of reddish raised tubercles which ulcerate; in one case, there was calcification of the internal iliac arteries; of three cases observed, the duration was in one for two years and in two for ten years. According to Matthews Duncan, this is a form of lupus which we shall have to notice specially as an affection of the vulva.

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[1] Seven undoubted cases of it, and fifteen of cancer of the cervix proper, are described in Williams' monograph.

[2] *Brit. Med. Jour.*, April 5, 1884.

There is also a form of adenoma which, though it is not malignant (*v.* p. 452), tends to become so. Fürst [1] has recorded a very interesting case of this in which the amputated cervix showed only the appearance of a cysto-adenoma, while 18 months afterwards the patient died of true cancer of the cervix.

PROGRESS.

During the first stage we may distinguish the three forms, but after ulceration has occurred they pass into one another and are no longer distinguishable.

As regards the further progress, there are *three modes of the spreading* of the disease; first, upwards into the body of the uterus; second, downwards into the vagina; and, third, into the connective tissue of the pelvis. This last is the most important. It takes place either by a continuous infiltration of the adjacent connective tissue, or as a chain of nodules running in the direction of the utero-sacral ligaments; these nodules, probably, correspond to lymphatic glands.

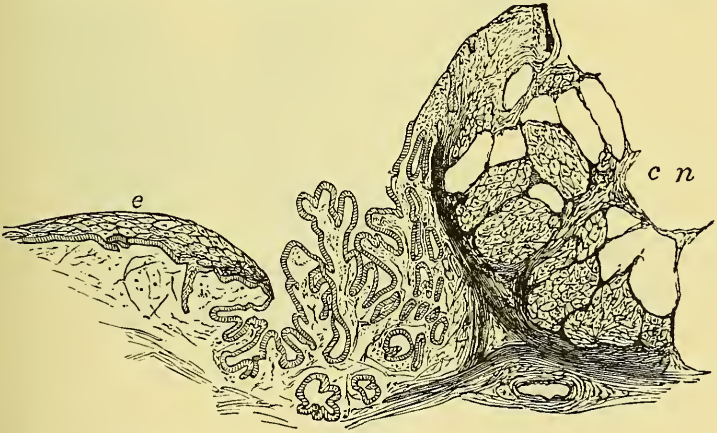

FIG. 277.

MICROSCOPIC SECTION OF A PORTION OF THE CERVIX UTERI SEEN IN FIG. 276. *e* squamous epithelium in several layers; *c n* carcinomatous nodule; between these is seen a portion of inflamed mucous membrane covered with a single layer of epithelium (*Schroeder*).

Cancer of the vaginal portion, according to Ruge and Veit, rarely spreads into the cervix but extends laterally into the fornices and adjacent connective tissue; cancer of the cervix spreads upwards into the uterus and also to the connective tissue. We shall see the importance of this, when we consider the extirpation of the uterus (*v.* p. 494).

In cancer of the cervix, Abel and Landau [2] have found changes in the

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[1] Ueber suspectes und malignes Cervix-Adenom: *Zeits. f. Geb. u. Gyn.*, XIV., S. 352.

[2] Ueber das Verhalten der Schleimhaut des Uteruskörpers bei Carcinom der Portio vaginalis: *Archiv f. Gyn.* XXXII., S. 271, and XXXV., S. 214.

mucous membrane of the body also—not only those of chronic inflammation, but also of carcinomatous degeneration; they further found microscopic changes exactly similar to sarcoma, but which might be the first stage of carcinoma of the body.

Eckart,[1] on the other hand, found only hyperplasia of the glands with papillary proliferation into their lumen, *i.e.* endometritis glandularis.

Saurenhaus, from the examination of a still larger amount of material,[2] has shown that the changes, though extensive, are of a benign character, whether we characterise them as a hyperplastic endometritis or a simple adenoma.

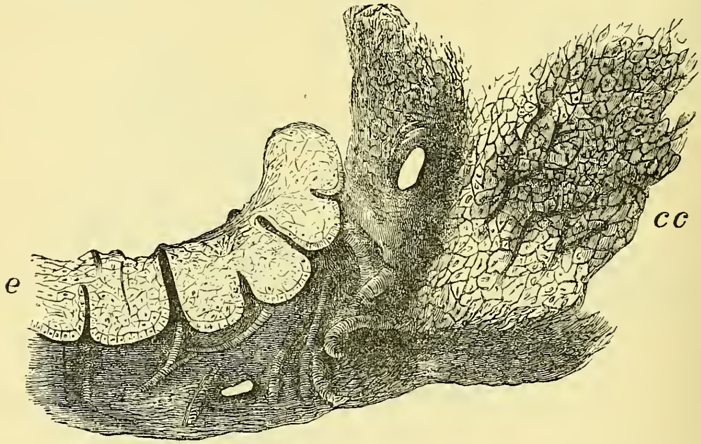

Fig. 278.

Section of a Flat Cancroid (epithelioma) of the Cervix. *e* squamous epithelium, *c c* carcinomatous cells; between these is seen some granulation tissue (*Schroeder*).

EXTENSION TO NEIGHBOURING ORGANS.

In its further progress, the carcinomatous growth invades the surrounding organs. Pushing its way forwards in the cellular tissue between the *bladder* and the uterus, it involves the mucous membrane of the former; it first produces vesical catarrh, then sloughing of the walls, and finally vesico-vaginal fistula. The bladder is affected in a considerable proportion of cases; of 311 cases of carcinoma this occurred in 41 per cent., fistula resulting in 18 per cent. (*Gusserow*). From the position of the ureters, they are frequently involved. The carcinomatous growth may press upon the ureters near their point of entrance into the bladder; or it infiltrates their walls, and the consequent thickening produces constriction at the part affected. Dilation of the ureter above thus results, which produces hydronephrosis and finally atrophy of the kidney. The frequency of this condition will be apparent from the fact that Blau found it present in 57 out of 93 post-mortem examinations.

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[1] From the examination of ten uteri extirpated by Kaltenbach for cancer of the cervix: *Centralb. f. Gyn.*, 1888, S. 426.

[2] Fifty uteri extirpated for cancer: *Centralb. f. Gyn.*, 1888, S. 755.

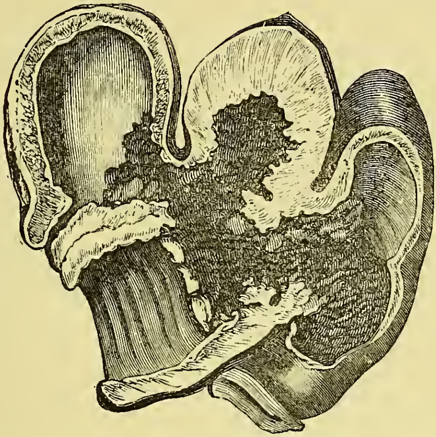

FIG. 279.
CARCINOMA beginning in the CERVIX UTERI, and ending in the production of recto-vesico-vaginal fistula (*Farre*).

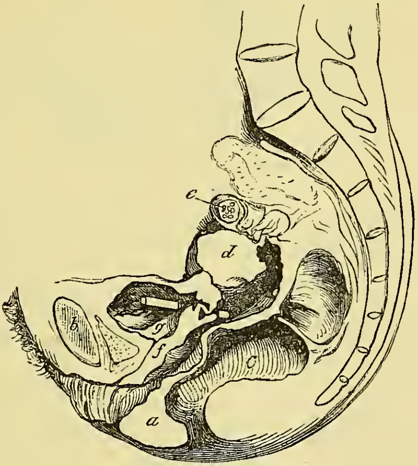

FIG. 280.
VERTICAL MESIAL SECTION OF PELVIS, FROM CASE OF CARCINOMA UTERI. *a*, Perineal body; *b*, Symphysis pubis; *c*, Rectum; *d*, Body of Uterus; *e*, Small fibroid; *f*, Urethro-vaginal septum; *g*, Bladder. A small tube passes between bladder and excavated cervix through a fistula (*Barbour*).

Artaud describes two degrees of kidney affection: with moderate pressure, the kidney is slightly enlarged and shows hypertrophy of the glomeruli and dilatation of the convoluted tubules with small-celled infiltration round both of these and the arteries; (2) with greater pressure, dilatation of the ureters and atrophy of the kidney. More rarely does the carcinomatous infiltration extend backwards into the *rectum* and produce recto-vaginal fistula; of 282 cases the rectum was affected in 18 per cent., fistula resulting in 8·5 per cent. (*Gusserow*).[1] When both bladder and rectum have been opened into, a common cloaca is produced as in fig. 279.

Perforation into the *peritoneal cavity* is rare. The peritoneum is not simply pushed forward, but is taken up into the carcinomatous growth. As this process goes on, adhesions are constantly being formed between the walls of the peritoneum in front of the growth so that it does not project free into the cavity beyond. These adhesions further prevent the peritoneal cavity from being opened into when the carcinomatous mass breaks down.

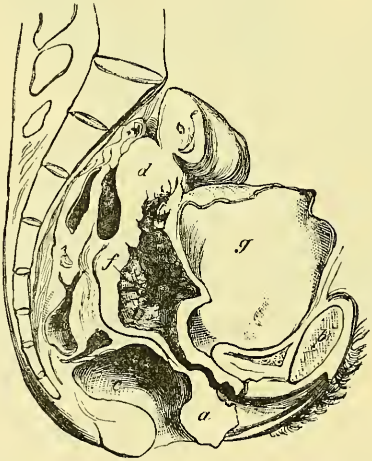

FIG. 281.

VERTICAL MESIAL SECTION OF PELVIS, FROM CASE OF CARCINOMA VAGINÆ ET UTERI. *f*, points to vagina eroded by disease; *e* is a malignant growth attached to uterus. Other letters as in fig. 280 (*Barbour*).

The accompanying sections (figs. 280, 281), made from post-mortem preparations, will serve to illustrate some of the points noted above.

Points to be noted in fig. 280.

Description of Pelvis with Cancer of Cervix.

1. Seat of disease in the *cervix;*
2. Complete destruction of the cervix and lower segment of the uterus;

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[1] Fere and Carron (Statistics of Complications of Carcinoma Uteri in 51 post-mortems at the Salpetrière 1881-83) found extension to the bladder with fistula in 18, to the rectum in 7, and to the peritoneum in 9 cases.

3. Production of an irregular cavity from the extension of the disease in *three* directions through the cellular tissue—

(*a.*) Behind the uterus,
(*b.*) Between the uterus and the bladder,
(*c.*) Between the vagina and the bladder;

4. The pouch of Douglas entirely obliterated and partially replaced by the carcinomatous excavation, the vesico-uterine pouch shortened by adhesions, perforation into the peritoneal cavity at one point;
5. Bladder small and contracted, carcinomatous fistula;
6. Rectum intact.

Points to be noted in fig. 281.

Description of Pelvis with Cancer of Cervix.

1. Vagina (as well as cervix) affected, the nymphæ had a cartilaginous consistence, inguinal glands enlarged—although not shown in figure;
2. Extension of the disease along the mucous membrane of the uterus, excavating it though not destroying the walls to the same extent as in fig. 280;
3. Partial obliteration of the pouch of Douglas;
4. Bladder dilated through pressure on the urethra, its walls apparently not involved;
5. Rectum intact.

ETIOLOGY.

The female sex is more liable to carcinoma than the male. According to Sir J. Y. Simpson's statistics, the proportion is 2½ to 1. These statistics are drawn from the Annual Reports of the Registrar-General for England during the years 1847-1861. During that time there were 87,348 fatal cases of carcinoma, of which 61,715 were among women and 25,633 among men. For the year 1860, the deaths from carcinoma among men were ·97 per cent. of the total male mortality, among women 2·2 per cent. The cause of this greater relative frequency is connected with the development of the sexual organs in the female. Up to puberty, the mortality (from carcinoma) of the sexes is the same; afterwards, the relative proportion of female to male deaths gradually rises till it attains its maximum about the age of 50, after which it falls away again (fig. 282).

The diagram on page 470 is based on the statistics of 91,058 deaths in Great Britain. It brings out three facts: the total number of deaths in each sex increases with age to a certain point; the increase among women is relatively the greater; it reaches its maximum at an earlier age with the female sex.

The most frequent seat is the uterus, where fully one-third of the total cases occur; the next in frequency is the mamma.

TABLE AND DIAGRAM OF COMPARATIVE FATALITY OF CARCINOMA IN MALE AND FEMALE, ACCORDING TO AGE.

Out of 91,058 deaths from carcinoma

751	males,	773	females	died	under 15 years.
562	,,	659	,,	,,	from 15 to 25 years.
1244	,,	3,176	,,	,,	,, 25 ,, 35 ,,
2717	,,	9,975	,,	,,	,, 35 ,, 45 ,,
4973	,,	16,668	,,	,,	,, 45 ,, 55 ,,
7220	,,	15,813	,,	,,	,, 55 ,, 65 ,,
6286	,,	11,840	,,	,,	,, 65 ,, 75 ,,
2637	,,	4,616	,,	,,	,, 75 ,, 85 ,,
364	,,	689	,,	,,	,, 85 ,, 95 ,,
20	,,	39	,,	,,	above 95 ,,

(*Sir J. Y. Simpson*).

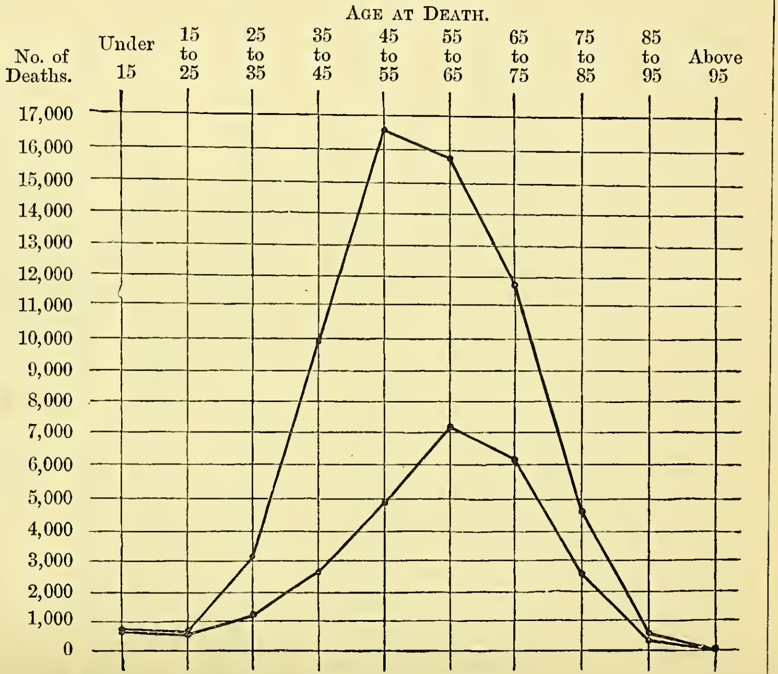

FIG. 282.
In the DIAGRAM, the *upper* line indicates mortality in the female, the *lower* that in the male.

Although the immediate etiology of carcinoma is unknown, there are certain causes general and local which favour its development.

1. The *general predisposing causes* are the following:—

Heredity;
Age;
Depreciation of the vital powers.

Race and Heredity.

The influence of *race* is brought out in Chisholm's statistics, which show that carcinoma is more than twice as frequent among the white population as among the black. As regards *heredity in families*, much less stress is now laid upon this than formerly.

> According to Gusserow's statistics, in 1028 cases heredity was proven in only 79, that is in about 7·6 per cent. Schroeder, placing the statistics of Sibley and of Barker together, shows that heredity has been proven in only 8·2 per cent.; Picot places it at 13 per cent. These figures show that we cannot lay much stress on heredity as a predisposing cause. On the other hand, we must remember that these statistics are drawn principally from hospital reports, from a class of people who know little about the former history of their families.

Age.

Age has undoubtedly a considerable influence upon the frequency of this disease. This is evident from the table given on page 472. Gusserow collected statistics of 2270 cases reported by various authorities. The mortality per cent. for various ages is represented by the curve in the diagram on page 472. From the table it is evident that carcinoma does not occur before puberty. The proportion of cases below 20 years (2 in 2270) is so small that it need not be taken into account. The first glance at the diagram would lead one to believe that the increasing frequency of the disease is due to the development of the functional activity of the sexual organs, but a more careful consideration shows that the increase continues and reaches its maximum after the latter has ceased. This table should be compared with that for Fibroid Tumours on page 414.

Depreciation of Vital Powers.

Whatever tends to *depreciate the vital powers* favours the occurrence of this disease. We meet with it more frequently among the poorer classes, where there is insufficiency of food with privation and hardship. Schroeder contrasts, in this respect, the development of carcinoma with that of myoma. In his polyclinic among the poorer classes, the proportion of carcinoma to myoma was as 100 to 61; in his private practice among the wealthier, it was as 100 to 332.

2. The *local predisposing causes* are the following:—

Erosion of the cervix and protracted catarrh;
Repeated parturition.

Influence of Split Cervix.

The relation of *erosion and laceration of the cervix* to the development of carcinoma has been recently pointed out by Ruge and Veit and also by Breisky. We draw attention to this point specially, because the most important differential diagnosis is that between long-standing

TABLE AND DIAGRAM SHOWING FREQUENCY OF CARCINOMA ACCORDING TO AGE OF PATIENT.

NUMBER OF CASES.

Out of 2270 cases

2	were under 20 years.
81	,, between 20 and 30 years.
476	,, ,, 30 ,, 40 ,,
771	,, ,, 40 ,, 50 ,,
600	,, ,, 50 ,, 60 ,,
258	,, ,, 60 ,, 70 ,,
82	,, over 70 ,,

(*Gusserow*).

PERCENTAGE PROPORTION.

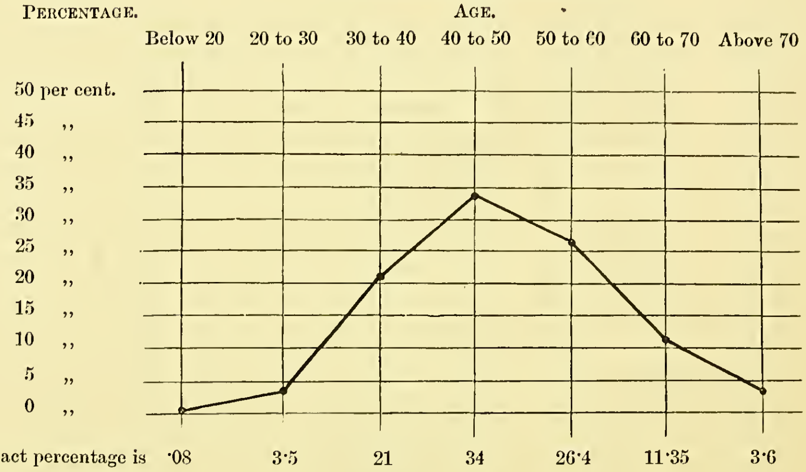

FIG. 283.

inflammation and commencing malignant disease; and the possibility that the former may pass into the latter should always be kept in view.[1]

Influence of repeated Parturition.

Repeated parturition has an important influence. Carcinoma is much more frequent in multiparæ. Gusserow finds an average of 5·1 children to every case of carcinoma, which is a high average productivity. Whether this is due to the greater functional activity of the uterus or to the production of fissures with their resulting chronic inflammatory changes, is a more difficult question.

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[1] Williams, however, in his cases never found the disease starting in a tear, and thinks that there is no evidence that laceration plays any part in the etiology of cancer.

CHAPTER XLI.

CARCINOMA UTERI (OF CERVIX): SYMPTOMS AND DIAGNOSIS.

LITERATURE.

See Literature of Chapters XL. and XLII.

SYMPTOMS.

The *local* symptoms of carcinoma uteri are three —

Hæmorrhage,
Offensive discharge,
Pain.

There are in addition a considerable number of *general* symptoms, which arise secondarily.

As a rule, however, no symptoms are present in the first stage, that is until ulceration sets in. In exceptional cases, when infiltration of the connective tissue or of the walls of the uterus has taken place at an early period, pain may be an early symptom; there is no pain so long as the disease is limited to the cervix. This entire absence of symptoms until the disease has already made considerable progress, is the reason of the great difficulty in ascertaining the period of its probable commencement. From the same cause, the patient does not seek relief till the possibility of eradicating the disease is much diminished.

LOCAL SYMPTOMS.

Hæmorrhage.

Hæmorrhage is usually the first symptom noticed by the patient. She observes that menstruation is more profuse than formerly. This, when the disease occurs late in life, she attributes to approach of the menopause. In other cases, profuse hæmorrhage occurs irregularly between and independent of the menstrual periods. Sometimes the hæmorrhage is noticed only after exertion (as straining at stool) or after coitus. Sometimes the patient states that "the menstrual flow never entirely ceases;" which means that the vaginal discharge is always tinged with blood. The explanation of hæmorrhage in these earlier stages is to be found in the vascularity of the stroma of the new formation. It is rich in delicate vessels which readily rupture. In the later stages, hæmorrhage is not a prominent symptom unless a large vessel be accidentally eaten into. Death from hæmorrhage is rare.

Discharge.

The *discharge* characteristic of carcinoma is not present until ulceration has occurred. In the papillary form of epithelioma[1] (cauliflower excrescence), there is a free discharge before the growth has begun to break down; this is of a watery character, has no odour, and is due simply to the transudation of serum. As soon, however, as ulceration occurs in any of the forms, there is a discharge containing the molecular debris of the breaking down tissue which gives it a characteristic and peculiarly offensive odour. In the rapidly growing forms (medullary) of carcinoma, there is an almost equally rapid molecular death of the newly formed tissue due to fatty degeneration of the epithelial cells. In epithelioma this discharge is less marked, because there is less necrosis of tissue; but in true carcinoma, especially in advanced stages, it is quite characteristic. In fact, a diagnosis may be sometimes made merely from the odour which hangs about the person. At first the discharge is yellowish-white in colour, but afterwards from the decomposition of the fatty cells it becomes of a reddish-brown; if there is hæmorrhage, it will be tinged with blood.

Pain.

Pain is not such a constant symptom as is usually supposed. Some cases run their whole course without the patient's complaining specially of pain. It is not present so long as the disease is limited to the cervix; hence it is of no use as a diagnostic of carcinoma of the cervix in its early stage, unless the cellular tissue has been at the same time involved. But as soon as the new growth has extended upwards to the body of the uterus or to the cellular tissue of the pelvis, pain is produced through pressure on or actual lesion of the terminations of the nerves. The character of the pain varies. It is "a dull gnawing pain localised in the pelvis or back," or "a sharp pain shooting through to the back or down the thighs to the knees;" this last is caused by simple pressure on the crural and sciatic nerves or, in the later stages, from affection of the cellular tissue of the nerve sheaths. Occasionally it is felt in the mammæ or other seats of uterine sympathetic pain. The intensity of the pain varies also in different cases; it is marked where there is more formation of new tissue and less ulceration, that is when there is more pressure on the nerve endings. Thus, if there has been much deposit between the uterus and the bladder accompanied with an increase of pain, we find that the pain diminishes when the mass breaks down and a vesico-vaginal fistula is formed. We may distinguish between pain due to the development of carcinoma, and that produced by the chronic peritonitis which accompanies it when the peritoneum becomes affected; the latter produces great sensitiveness of the abdominal walls to pressure, and a board-like rigidity from reflex spasm of the muscles.

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[1] Though, as we have said, we have not at present a truly *pathological* classification of the different forms of carcinoma, it is convenient, *clinically*, to use the terms Epithelioma and true Carcinoma. By them we do not imply anything as to the origin of the disease. By epithelioma we understand those forms which begin more superficially, spread more slowly, and do not tend to involve the connective tissue.

GENERAL SYMPTOMS.

In addition to these local symptoms which are immediately due to the carcinomatous infiltration and degeneration, there are more general symptoms which arise secondarily.

Debility.

First we mention *loss of flesh* and *general debility*. The patient may continue healthy and well-looking in the early stages; sometimes, one is surprised to find that the disease is already well advanced in a patient who to outward appearance is in perfect health. But, sooner or later, the drain on the system produces great emaciation. The patient also has a careworn expression, partly from this loss of flesh and partly from the constant pain; from this expression alone, known as the "cancerous facies," the diagnosis may sometimes be made.

The wasting (marasmus) is occasioned not only by the drain of the new growth, but also by *disturbances* of the *digestive system* which arise in the course of the disease. Loss of appetite may amount to disinclination for food, and digestion is interfered with. This is produced at first sympathetically, as in other uterine disorders; but latterly it is due to gastric catarrh, constipation, the condition of the blood (anæmia and uræmia), and the unhealthiness of the atmosphere resulting from the offensive discharges.

There is, further, *painful micturition and defæcation* according to the extent to which the bladder and rectum are involved. The latter is always present, as the rectum, whenever it is distended, presses upon the carcinomatous growth. When fistulæ are produced, the urine and fæces pass per vaginam.

Pruritus vulvæ frequently results from the acrid and irritating discharge, and from the dribbling of the urine from a fistula. The *skin* acquires in the later stages a *dingy straw tint*, which when very marked is suggestive of jaundice. That disease may actually be present when there is secondary carcinoma of the liver, but this is rare. The colour is due to the anæmia, or (according to Barnes) to the absorption of decomposed fæcal matter (copræmia).

DIAGNOSIS.

As the patient does not seek advice till the carcinoma has begun to ulcerate, the physical signs have by that time become well marked and the diagnosis is usually easy.

Vaginal Examination.

On making a *vaginal examination*, the finger feels the enlarged, thickened, irregular, everted lips of the cervix spreading like a mushroom in the vagina (described by Malgaigne as "champignons cancéreux"). Sometimes a distinct tumour is present, the form of which is sufficiently indicated by the term cauliflower excrescence (see fig. 284). In other cases the finger feels an irregular ulcerated surface in the position of the cervix, soft and friable with hard and unyielding margins. The examining finger is stained with blood, and the odour of the discharge cannot fail to be recognised. If there is any doubt as to diagnosis, a fragment should be removed and examined microscopically. The appearance of a fibrous stroma with alveoli which contain irregular cells of an epithelial type with one or more large nuclei, will confirm the diagnosis of carcinoma.

Speculum.

The *speculum* need not be used for the recognition of carcinoma, except in its early stage or to ascertain more exactly the seat and extent of the growth. If the disease be far advanced and the diagnosis certain, the introduction of it causes unnecessary pain and hæmorrhage.

Rectal Examination.

The *rectal examination* is valuable, and in these cases should always be carefully carried out. It gives us important information in two distinct classes of cases. First, in early carcinoma or in cases where there is a suspicion of commencing carcinoma, the cellular tissue of the pelvis should be carefully examined to ascertain whether any localised deposit or enlarged glands can be felt; this can be done most easily by the rectal examination. If it is desirable to introduce two fingers into the rectum or if the examination causes much pain, the patient should be narcotised. Second, in cases of advanced carcinoma where the vaginal examination is difficult on account of the hæmorrhage and pain which it occasions, a more thorough examination can be made per rectum. The finger can reach higher up than per vaginam, and thus we can ascertain the extent of the carcinomatous deposit and the size and

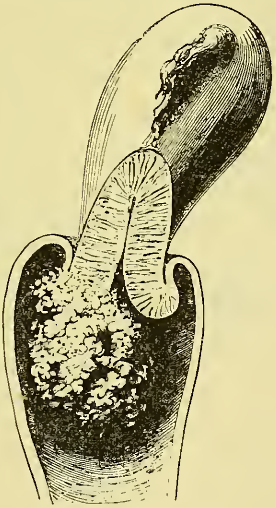

FIG. 284.

CAULIFLOWER EXCRESCENCE GROWING FROM THE CERVIX UTERI (*Sir J. Y. Simpson*).

mobility of the uterus. The condition of the rectal mucous membrane itself is observed at the same time, to ascertain whether it is already involved in the disease. In some cases the rectal examination is the only one possible, as in the case of carcinoma vaginæ represented at fig. 281 where the deposit round the ostium vaginæ made the introduction of the finger impossible.

DIFFERENTIAL DIAGNOSIS.

The following are the most important lesions from which carcinoma is to be differentiated :—

Hypertrophy of the cervix, with induration and occluded follicles;
Papillary erosion or ectropium, with cicatricial tissue;
Syphilitic ulceration, condylomata on the cervix;
Small fibroid in the cervix, sloughing polypi;
Retained portions of placenta or membranes;
Diphtheritic inflammation of the mucous membrane;
Sarcoma of the cervix.

As regards the first two of these, it is evident that carcinoma resembles them only at an early stage. But it is precisely at this stage that a correct diagnosis is all important for treatment. We should also remember (as Ruge and Veit have pointed out) that these conditions may be at once the result of chronic inflammation and the starting-point of malignant disease. The statement of the patient that the symptoms have existed for a long time, should not throw us off our guard. In *all* cases in which a patient *over forty years of age* seeks advice *with symptoms referable to the pelvis, a careful examination should be made.* We may thus accidentally discover carcinoma in an early stage, while still within the possibility of radical treatment. If the carcinomatous infiltration be general it cannot be distinguished, except by microscopical examination, from chronic induration. When localised, the diseased part is distinctly marked off from the adjoining tissue, shows a difference in its level, and is of a slightly yellow colour with granular yellowish-white inequalities.[1] Where there is only suspicion of carcinoma, there is no harm in excising a portion of the suspected part and submitting it to *microscopic investigation.* A careful examination per rectum of the pelvic cellular tissue should always be made as mentioned above.

Importance of Pelvic Examination in Cancer.

A superficial ulcerating epithelioma might be mistaken for a simple erosion, but has *thickened infiltrated edges.* The latter may, however, pass into the former.

Condylomata on the cervix simulate epithelioma, but they disappear under appropriate treatment. Syphilitic ulceration produces sometimes deep excavation, even a rectal fistula. This at the first glance might be taken for carcinoma, but more careful examination and inquiry into the history of the case will remove all doubt.

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[1] Stratz—Zur Diagnose des beginnenden Carcinoms an der Portio: *Zeits. f. Geb. u. Gyn.*, Bd. XIII., S. 89.

Small myomata are more sharply defined than a carcinomatous nodule of the same size, because the surrounding tissue is not infiltrated.

When a small submucous fibroid or a cervical polypus has ulcerated, it presents appearances similar to an ulcerating carcinomatous nodule. The former however is firmer and fragments cannot be broken off by the finger-nail, while the latter is friable and breaks down easily.

Carcinoma in the Puerperium.

The possibility that carcinoma may be first noticed during the puerperium should always be remembered. There should be no difficulty in diagnosing between carcinoma of the cervix and a retained portion of placenta. If the finger be passed in, it will discover whether the suspected fungus-like mass be simply lying in the cervical canal or be springing from its walls. We have seen several cases of carcinoma in patients who were supposed to be having an abortion. In the case of carcinoma of the fundus, differential diagnosis is more difficult and will be discussed under that head.

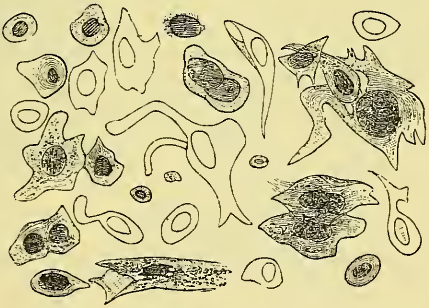

Fig. 285.

Scraping from Carcinoma of the Cervix, stained with logwood, $\frac{250}{1}$; drawn by S. Delépine.

Diphtheritic inflammation of the mucous membrane may easily be confounded with ulcerating carcinoma (*Schroeder*). The irregular swelling of the mucous membrane and the offensive discharge tinged with blood, which are present in diphtheritic inflammation, may be suggestive of carcinoma at the time; but this superficial resemblance soon disappears.

Sarcoma of the cervix is a very rare condition. Sarcomatous tumours are softer and grow more rapidly than carcinomatous. A positive diagnosis can only be made after microscopical examination of scrapings taken from the tumour (fig. 285).

PROGNOSIS.

The prognosis in carcinoma is always very grave. The possibility of spontaneous cure is a disputed point. There is one apparently well-authenticated case recorded by Habit.[1] Another is mentioned by Barnes,[2] in which there is some doubt as to the correctness of diagnosis. The prognosis as to the probable duration of life will depend on the extent to which the disease has already advanced and the possibility of checking its progress or even extirpating it altogether by operative interference. With regard to the results of operative interference, *see* under Treatment.

As regards the duration of disease if not interfered with, there is a slight difference of opinion. This may be explained by the variable period in the course of the disease at which the symptoms appear. Sir J. Y. Simpson gives the probable duration of life after the detection of the disease as from 2 to 2½ years; Gusserow and Schroeder give it as from 1 to 1½; while, according to Fordyce Barker, it is as long as 3 years and 8 months. The statistics of H. Arnott, drawn from 57 carefully observed cases, give the duration, after the first symptom (usually a flooding), of true cancer as 53·8 weeks; of epithelioma, 82·7 weeks. We may say therefore to the patient's friends that the disease will run a course of from one to two years. It is better not to tell the patient herself what her trouble is, though its serious nature should not be disguised.

CAUSES OF DEATH.

The causes of death, arranged in the order of importance, are the following:—

Exhaustion,
Uræmia,
Peritonitis,
Septicæmia,
Hæmorrhage.
Venous thrombosis.

Exhaustion.

Exhaustion, under which we include *marasmus*, is the result partly of the drain on the system and partly of the inability to take food.

Uræmia.

The importance of *uræmia* as a frequent cause of death has only recently been pointed out. According to Seyfert,[3] in the majority of cases death results from it. It is due to compression of the ureters, as already described under Pathology. It may be acute, accompanied by coma and convulsions; more generally it is chronic, and shows itself in the dulness of the patient, occasional headache, and decreasing sensibility to pain—which diminishes suffering as the disease approaches its termination.

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[1] *Sydenham Society's Year Book*, 1864, page 401.

[2] Barnes, *Diseases of Women*: London, 1878.

[3] *Säxinger*, *Prager med. Vierteljahrsschrift*, Bd. I., S. 103.

Peritonitis is sometimes the cause of death, but not so frequently as one would suppose; the disease is prevented from extending to the peritoneum generally by the adhesions which are formed. When peritonitis occurs, it is localised and chronic; in some cases, however, a general peritonitis is set up which proves fatal. *Perforation* may take place from the sudden giving way of adhesions; the escape of the carcinomatous debris into the peritoneal cavity produces death from shock or septic peritonitis. The preparation shown at fig. 286 was taken from a patient in whom the cause of death was *rupture of the uterus.* The case is reported and the preparation described by A. R. Simpson (op. cit., p. 276). There was carcinoma of the cervix which had contracted the lumen of the canal; the cavity of the uterus was expanded, the walls being thinned out; at the fundus "was a small perforation about the size of a pea, with thin edges," through which fluid had escaped and set up peritonitis which rapidly proved fatal.

Peritonitis.

Perforation.

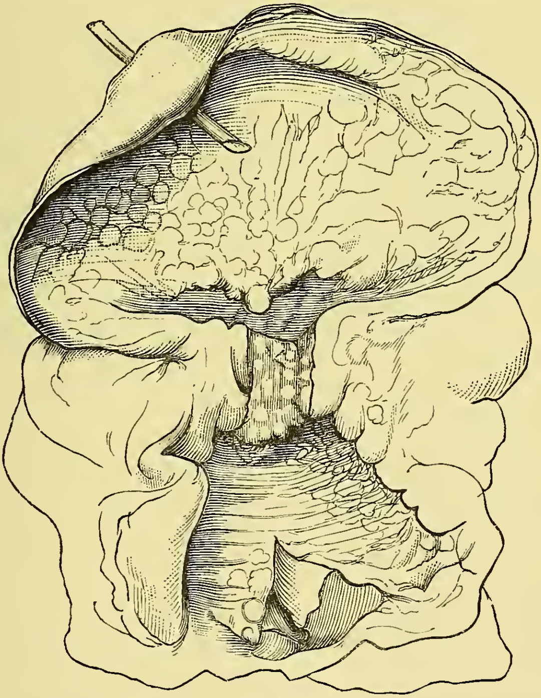

FIG. 286.

CARCINOMA OF THE CERVIX LEADING TO OCCLUSION OF OS UTERI, dilatation of uterus and perforation (*A. R. Simpson*). Uterus and vagina laid open; a quill is passed through the perforation.

Septicæmia suggests itself as a likely cause of death. We are familiar with it as produced in the puerperal condition: it is explained by the

Septicæmia.

fact that, at that time, there is abundant means for absorption in the numerous lymphatics and large veins which have been recently lacerated; hence, whenever septic matter is present, there is great risk of septicæmia. Similar conditions exist in carcinoma, during the progress of which the blood vessels are eroded and their extremities bathed in putrid matter. Barnes has drawn special attention to this as a source of blood-poisoning; according to Eppinger's[1] observations its occurrence is rare, and this he ascribes to the diminution of the absorptive power of the eroded vessels.

Hæmorrhage.

Hæmorrhage is in very rare instances immediately fatal. As already pointed out, though it is important as an early symptom, it occurs less frequently and is less abundant as the disease advances. If a large vessel be suddenly opened into, a fatal hæmorrhage may follow.

Thrombosis.

Venous thrombosis, due to mechanical compression of the veins, sometimes occurs; and a clot may be detached producing embolism in the lungs. Fatty degeneration of the heart is, sometimes, also present.

Patients with cancer have also died of tetanus,[2] which has been ascribed to the action of micro-organisms from secretion retained through plugging of the vagina.

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[1] *Prager med. Wochenschrift*, 1876, S. 210.

[2] See case by Hofmeier: *Centralb. f. Gyn.* Bd. XI., S. 171.

CHAPTER XLII.

CARCINOMA UTERI (OF CERVIX): TREATMENT.

LITERATURE.

Barnes—Diseases of Women, p. 856: London, 1879. *Currier, And. F.*—Removal of the Uterus for Cancer: N. Y. Med. Jour., vol. xxxiv., p. 494. *Duncan, W. A.*—On Extirpation of the entire Uterus: London Obstet. Trans., 1885, p. 8. *Freund*—Samm. klin. Vorträge, Nr. 133; and Centralbl. f. Gyn., N. 12, 1878. *Gusserow*—Die Neubildungen, etc.: Stuttgart, 1885, S. 199. *Hegar und Kaltenbach*—Die Operative Gynäkologie, S. 391. *Hofmeier*—Zur Statistik des Gebärmutterkrebses und seiner operativen Behandlung: Zeitsch. f. Geb. und Gyn., Bd. X., S. 269. *Lewers*—On the supra-vaginal amputation of the cervix uteri for malignant disease, etc.: Lancet, 1888, I., p. 464. *Pawlik*—Zur Frage der Behandlung der Uteruscarcin.: Wiener Klinik, 1882, Hft. XII., S. 425. Ueber die endgültige Heilung des Carcin. cervic. uteri durch die operation—Zeits. f. Geb. u. Gyn., Bd. XIII., S. 360. *Sänger*—Zur vaginalen Totalexstirpation des carcinomatösen Uterus: Archiv f. Gyn., Bd. XXI., Hft. I. *Schroeder*—Charité Annalen: V. Jahrgang, S. 343, Zeitschrift für Geburtshülfe und Gynäkologie: B. III., S. 419; B. VI., Heft II., S. 218. *Simpson, A. R.*—Carcinoma Uteri; Contributions to Obstetrics and Gynecology, p. 261: Edinburgh, A. & C. Black. Case of Extirpation of the Cancerous Uterus through the Vagina: Edin. Obst. Trans., vol. vii., p. 136. *Simpson, Sir J. Y.*—Diseases of Women, p. 170: Edinburgh, 1872. *Sims, Marion*—The Treatment of Epithelioma of the cervix uteri: American Journ. of Obst., July 1879. *Thomas*—Diseases of Women, p. 591: 1882. *Van de Warker*—A new method of partial Extirpation of the cancerous Uterus: Am. Journ. of Obstet., March 1884. See also Index of Recent Gynecological Literature under—Uterus: Cancer of, and Extirpation of (for cancer).

The treatment of carcinoma ought to be regarded in two aspects: first, as treatment of *the symptoms;* second, as treatment of *the disease.* Again, the treatment of the disease may be either *palliative* or *radical.*

We need not discuss here the vexed question whether carcinoma is a constitutional or a local disease. It cannot be too strongly impressed on the practitioner that, as far as our present experience goes, in attacking the disease itself he must rely upon *surgical* and not on *medical* treatment. Our aim ought to be the removal of the disease and not merely the alleviation of the symptoms. To remove it completely we must recognise it early. Up to the present time successful treatment has been a rare occurrence, because we have failed to recognise carcinoma in its commencing stages. The possibility of treating it successfully in the future will depend on the possibility of our recognising it in its commencement. Not less important than early recognition is complete removal and that without delay. In the uterus, more readily than in the mamma, does the carcinoma get beyond the reach of the operator. In carcinoma mammæ, we can excise not only the breast but also the axillary glands if these should be already implicated. But, in carcinoma uteri, as soon as the pelvic glands are involved the case is hopeless as regards a radical cure.

We shall consider, first, the treatment of the symptoms; because, in the majority of cases, when the patient comes under our notice, the disease itself has already got beyond our remedies.

TREATMENT OF SYMPTOMS.

These are hæmorrhage, offensive discharge, pain.

HÆMORRHAGE.

In the treatment of hæmorrhage, there are two points to be considered: *first*, the instructions to be given to the patient; and, *second*, the means which we can ourselves employ.

Use of Ergot.

(1.) The patient is instructed to take the liquid extract of ergot in large doses whenever there is much hæmorrhage either during the menstrual period or independent of it. If she is subject to floodings, a friend might be taught how to give the ergotin solution hypodermically. Ice applied to the vagina and injections of cold water check hæmorrhage; a small piece of sponge or tampon of wadding, soaked in perchloride of iron, might be passed into the vagina if cold is not sufficient. The patient is recommended to avoid sexual intercourse, as this favours active congestion and in some cases is the cause of hæmorrhage.

The Vaginal Tampon.

(2.) The means at our own command are the following:—

Simple pressure, effected by complete and thorough plugging of the vagina;

The use of styptics, caustics, or the actual cautery;

The removal of diseased tissue by the curette or other means.

The plugging of the vagina should be done whenever we are called in on account of profuse hæmorrhage. The packing is carefully done with pledgets of lint or cotton wadding (with string attached) soaked in carbolic oil; the speculum is introduced carefully and not carried high up.

Of styptics, the best are the perchloride and the pernitrate of iron. Sir. J. Y. Simpson recommended a saturated solution of the perchloride in glycerine. A pledget soaked in either of these is introduced, and placed so as to be in contact with the bleeding surface; and the rest of the vagina is packed, as above described, with the pledgets steeped in carbolic oil. The perchloride should be used with great caution in cases of advanced ulceration, as we have seen it corrode into the tissue so as to reach the peritoneum and produce peritonitis. The use of caustics, cautery, and curette, will be considered under Operative Treatment.

OFFENSIVE DISCHARGE.

This is best treated by astringent and antiseptic injections. These should be used frequently, as it is important to keep down the unpleasant odour and make the patient's surroundings as comfortable as possible. If the discharge be plentiful and not very offensive, as in the cauliflower excrescence, the indication is more for the use of astringents like sulphate of alumina and iron (4 grains to the oz.). Tannin or sulphate of zinc can also be used, and it is well to change the astringent occasionally. If there is much necrosis of tissue with very offensive discharge, carbolised water (1 to 50) is required.

Acetate of lead (ʒ1 to ℥20) is recommended by Barnes. Solution of bromine (1 of the B.P. solution to 3 of water) is a good disinfectant, but its odour is disagreeable. Condy's fluid is largely used, but it is only deodorant not disinfectant. The skin round the external genitals should in all cases be protected from the acrid discharges, as the irritation is a source of discomfort. A lotion of equal parts of olive oil and glycerine or of olive oil and lime water, applied after each vaginal injection, serves this purpose well.

PAIN.

Use of Opium.

This can be effectually relieved only by some preparation of opium; it is well to delay the habitual use of this remedy as long as possible, as it interferes with digestion and nutrition. It may be given as a morphina suppository ($\frac{1}{4}$ of a grain in each) per rectum, or as the liquor morphinæ hydrochloratis by the mouth. We obtain its action most surely and quickly and with the least disturbance of the digestive system by giving it hypodermically. It is desirable to change the narcotic, as even opium gradually loses its effect; the hydrate of chloral, in 20 grain doses, may be used as a substitute. Various local anodynes have been suggested, but are of little use.

General Treatment.

Attention to the *general condition* of the patient is very important. The three main points are to give a sufficient quantity of nutritious and easily digestible food, to keep the bowels regular, and to have the atmosphere healthy and the surroundings cheerful. Food should be given in small quantities and frequently; milk, eggs and beef-tea should be substituted for more solid food as soon as digestion fails. In the later stages, the bowels should be evacuated by enemata rather than by purgative medicines. The room should be well ventilated by day and night, and the vaginal injections repeated frequently. Gusserow recommends that during the night a piece of waterproof sheeting be tied round the patient's waist to keep down the disagreeable odour.

TREATMENT OF THE DISEASE.

As before stated, our aim here is extirpation. If complete removal be possible, carcinoma will be no longer the incurable disease which haunts the mind of the patient and baffles the skill of the practitioner. The principles of treatment can be best understood by considering the progress of the disease as consisting of three stages: (1) when the disease is present as a germ infiltrating healthy tissue; (2) when the germ has developed into a tissue having the typical carcinomatous structure; (3) when this newly-formed tissue breaks down. The accompanying diagram (fig. 287) illustrates this progress. The three stages are represented by three zones.

Diagram of spread of Cancer.

The extent of zone 1 is not well defined, for we have no means, unless with the microscope, of ascertaining how far the surrounding tissue is infiltrated. The area of zone 2 is more definite; the line *a b c* is well marked, for the carcinomatous tissue when fully formed has characteristics by which it can be recognised from the surrounding healthy tissue by touch or sight. Zone 3 represents the third stage, in which the immediate danger to the patient lies. It is not the *formation* of the carcinomatous tissue which is dangerous, but its *ulceration* with accompanying hæmorrhage and exhausting discharge.

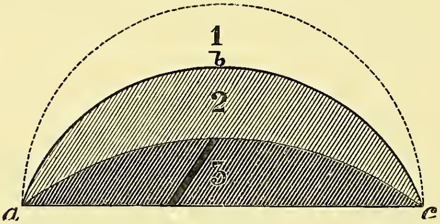

Fig. 287.

Diagram to illustrate the spreading of Carcinoma. 1, Healthy tissue infiltrated with germs of Carcinoma; 2, Carcinomatous tissue fully developed; 3, Carcinomatous tissue breaking down.

From these facts we deduce the following principles of treatment. *First*, to effect radical cure we must remove zone 1, as well as zones 2 and 3; *i.e.*, we must remove not only the tissue which is evidently carcinomatous, but also all the surrounding tissue which may contain germs of the disease. Sometimes by a chance the operator has done this through keeping well clear of the evidently diseased part, and thus we can explain the few recorded cases of cure. *Second*, we may anticipate the natural process of breaking down, with its accompanying exhausting results and risks of a fatal hæmorrhage, by destroying the newly formed carcinomatous tissue as far as it is recognisable. We shall thus save the patient from the effects of the disease until zone 1 has passed into the condition of zone 2 and is beginning to break down. Thus we explain the temporary benefit (for a period measurable by months) derived from the partial excision of the new growth. *Third*, the application of caustics alone may effect the destruction of area 2; but we are not so sure that we are removing the *whole* up to line *a b c*, as we are when using the knife or other cutting instrument. The latter means is preferable because we can make certain that we have reached this line in all cases where it is attainable by operation. *Fourth*, the use of the knife and the application of caustic to the raw surface will, where the disease has spread far, be more effectual than the use of the knife alone; the caustic will now without doubt operate on the area of zone 1 and destroy so far the germs of the disease :—

There are four methods of operative treatment :—

1. Application of caustics,
2. Scraping out of diseased tissues,
3. Amputation of the cervix,
4. Excision of the uterus.

APPLICATION OF CAUSTICS.

Caustics in treating Cancer.

This should scarcely come under the head of treatment of the disease. All that we can hope for in the application of caustics is merely a superficial destruction of the growth and consequent temporary alleviation of the distressing symptoms. The caustics which we may use are the following. *Strong nitric acid* is applied with a dossil of lint, the diseased surface having first of all been washed and carefully dried in order to prevent the acid from running; it is again washed to remove superfluous acid. An alcoholic *solution of Bromine* (1 to 5) has been recommended by Routh [1] and Wynn Williams; [2] cotton wadding soaked in it is applied to the diseased part to produce a slough, and the rest of the vagina protected by wadding wet with bicarbonate of soda. Numerous other caustics have been tried.

The results of this method are only temporary. The superficial layers of the growth are destroyed while the hæmorrhage and discharge cease for a time. Cicatricial contraction takes place on the surface, but the hard infiltration can be felt extending beyond. According to Campbell de Morgan,[3] the superficial application of caustics acts as an irritant producing increased growth of the new formation; so that when they are used they must be applied thoroughly.

SCRAPING OUT OF DISEASED TISSUE.

We have recourse to this means of treatment (1) in cases in which the disease is not of a form suitable for amputation—when it does not form a pediculated mass but is spreading along the mucous membrane of the vagina, (2) in cases which are too far advanced for amputation of the cervix. This method is good and safe in principle, because the carcinomatous tissue is soft and friable compared with the surrounding connective tissue and can be therefore easily scraped away.

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[1] *British Medical Journal*, February and March 1880.

[2] *London Obstetrical Transactions*, vol. xii., p. 249.

[3] "The origin of Cancer considered with reference to the treatment of the disease," 1872.

Curette in treating Carcinoma.

The means which we employ are the curette or the sharp spoon. Sir J. Y. Simpson used to scrape out the diseased tissue with the finger-nail or the curette. The sharp spoon introduced by Simon[1] is the most efficient instrument: it should be used with short firm strokes, and the raw surface examined from time to time with the finger to feel whether all the hard nodules have been removed. After the scraping has been thoroughly carried out, the surface is burned by the actual cautery and the vagina tamponed to prevent hæmorrhage. The results of this method are more satisfactory than those which follow the application of caustic alone; they depend entirely on the thoroughness with which the scraping has been done.

AMPUTATION OF THE CERVIX.

This operation is called for by two sets of circumstances: (*a*) when the disease is as yet limited to the cervix and there is a distinct line of demarcation above, so that in operating we can cut through healthy tissues; (*b*) when it has spread so far that although we cannot operate upon healthy tissue, we are yet justified in removing as far as possible the projecting mass.

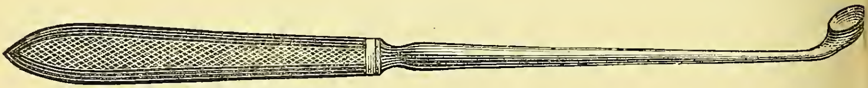

FIG. 288.
SIMON'S SHARP SPOON.

The means of amputation are the following:—

Écraseur, or galvano-cautery;
Knife and scissors, followed by ligature or caustics.

I. ÉCRASEUR, OR GALVANO-CAUTERY.

Relative advantages. Both of these possess the advantages that they are easy of application and cause less hæmorrhage than the knife, although with the latter we can follow more certainly the line of demarcation. The écraseur has the advantage that it is easily portable, requires no preparation, and is always ready when wanted. On the other hand, there is danger that the peritoneum of the pouch of Douglas or of the bladder may be lacerated by the chain. The galvano-cautery is inconvenient to carry about and is not always ready when wanted,

Écraseur and Galvano-Cautery compared.

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[1] *Berlin, Beiträg. zur Geburt. u. Gyn.*, 1872, Bd. I.

but has the advantage that we do not need to draw down the uterus to apply it; in all cases of operation upon the cervix for carcinoma, the less traction that is made upon the uterus the safer for the patient. As the ordinary écraseur (fig. 289) has the chain in a line with the handle, the cervix must be drawn down to the vulva for the working of the instrument. This difficulty is obviated in the curved form of instrument, and in the wire écraseur devised by Sir J. Y. Simpson. The galvano-cautery not only amputates but, at the same time, cauterises the stump; this is a questionable advantage as, though it may diminish the probability of hæmorrhage, it prevents us from examining whether all the diseased tissue has been removed.

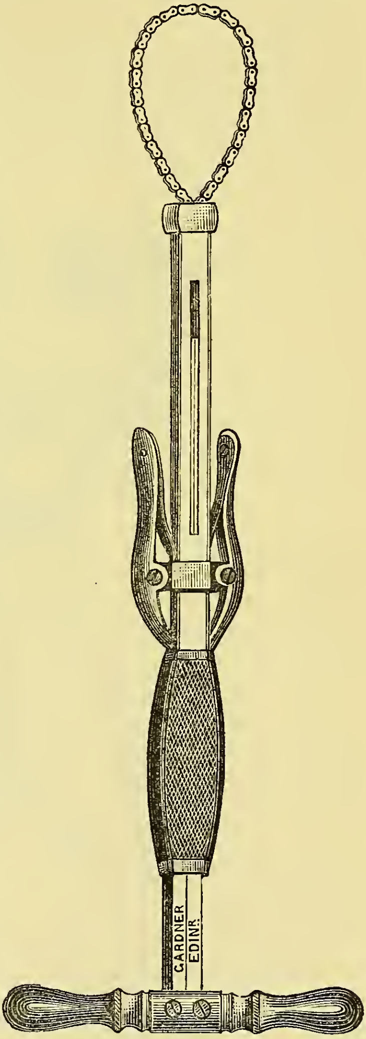

Fig. 289.

Ordinary Chain Écraseur.

By compressing the small side handles, the chain is allowed to run out freely. It is drawn in by a pumping motion of the large cross-handle.

Mode of employment. Put the patient under chloroform. If the curved écraseur or the galvano-caustic wire be used, place the patient semi-prone; only one assistant is necessary — to hold the Sims speculum. If the straight écraseur is used or it is desirable to have the parts well exposed, the lithotomy posture is better; the two assistants who hold the legs can at the same time draw aside the labia with retractors, while a third draws back the posterior vaginal wall and perineum with the Sims speculum. Now lay hold of the cervix or tumour with volsellæ, and if necessary draw it down to the vulvar orifice. Place the wire or chain round the cervix or the pedicle of the carcinomatous mass (fig. 290), as far above the limits of the disease as possible, so as to cut through healthy tissue, but not above the line of reflexion of the mucous membrane of the posterior fornix

Mode of using Écraseur.

upon the vaginal portion lest it should cut into the pouch of Douglas. After the écraseur has begun to crush the tissues, *work it slowly*—shortening the loop at the rate of one notch in every twenty to thirty seconds.

Method of using Galvano-Cautery.

In using the galvano-caustic wire place it in position cold, tighten it up so as to constrict the cervix, and then make the current. To prevent the slipping of the wire, Thomas has devised forceps with shoulders, which he uses in place of volsellæ. Byrne of Brooklyn, who has had a large experience with the galvano-cautery, has pointed out that if gradual traction be made on the cervix during the action of the wire the result will be a funnel-shaped excavation; by this means more of the cervix will be removed. *Tighten the wire gradually*, so as to burn through—not cut—the tissue. After amputation, examine the surface of the stump. If there is much hæmorrhage, apply a styptic to the stump directly or on a pledget of cotton wadding, and pack the vagina

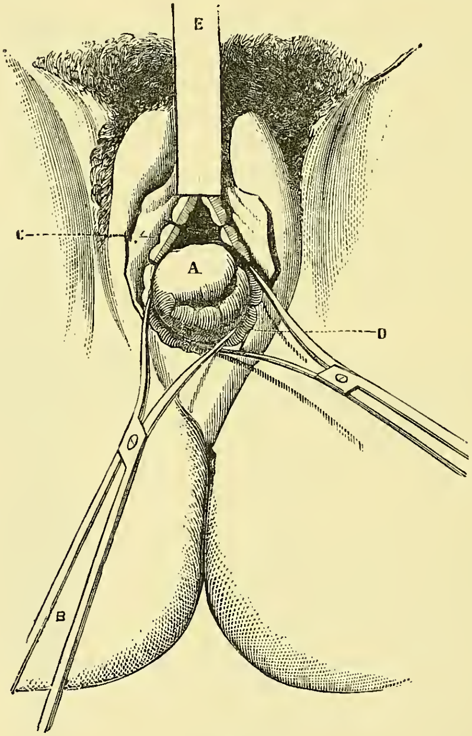

Fig. 290.

Straight Écraseur in Position. *A* cervix drawn to vulva with Museux's forceps; *C D* chain; *E* stem of écraseur (*Chassaignac*).

with carbolised lint or wadding; this packing should not be discarded for a week or ten days, as the great after-danger is hæmorrhage.

Several cases of cure have certainly been observed, but only where the whole disease has been removed.

Sir J. Y. Simpson records three cases. In the first the patient was well eighteen years after the operation and had, in the meantime, given birth to five children. Another patient died, four years after removal of the disease, of cancer of the peritoneum, there having been no local return. The third died after four years, of dysentery.

Ziemssen, Barnes, Byrne, A. R. Simpson, Thomas and others also record several successful cases.

The most interesting statistics of amputation of the carcinomatous cervix with the galvano-cautery are those given by Pawlik. He has gone into the after history of the one hundred and thirty-six cases operated on by C. Braun in the Vienna Clinic since 1861. The mortality from the operation was $7\frac{1}{3}$ per cent.; 26 of the cases were still without a recurrence two years after the operation, the longest period being $19\frac{1}{2}$ years. None of the patients gave birth to a viable child after the operation, abortion always occurring.

II. Knife and Scissors. The advantage claimed for this method of operating is that it allows the operator to follow the line of demarcation between the diseased and the healthy tissues; if in the course of the amputation he finds the carcinomatous new formation extending higher up than he anticipated, he can remove as much more of the suspected part as may be necessary.

There are disadvantages in stitching up the wound so as to produce union by first intention. We must save enough mucous membrane to close in the wound, which would be cut away were we to leave the wound to granulate; and in this, diseased tissue may be left. Further, in the wound itself, germs of the disease may be present which would be destroyed by the subsequent application of caustic.

As examples of amputation by the knife and closure of the wound by sutures, we shall describe the method adopted by Schroeder of Berlin. According to the extent of tissue to be removed, he performs either (*a*) amputation of the vaginal portion, or (*b*) supra-vaginal excision of the whole cervix.

A. *Amputation of the vaginal portion.* The cervix is divided on both sides with the scissors so that distinct anterior and posterior lips are produced. A wedge-shaped portion is excised out of each of these (fig. 168) and the flaps stitched together. The lateral incisions in the cervix are then closed by sutures.

Schroeder's mode of amputating Cervix.

B. *Supravaginal incision of the whole cervix.* 1. The cervix having been drawn down with the volsella, or with a hook if the tissue is friable, the knife is carried through the vaginal mucous membrane of the *anterior fornix* round the base of the anterior lip into the cellular tissues below (and beyond the diseased tissue). The bladder is easily separated from the cervix almost as far as the utero-vesical pouch of peritoneum, and retracts upwards carrying the ureters with it; a sound must be passed into it, to define its position.

2. The cervix is now carried forwards; and the mucous membrane of the *posterior fornix*, which is thus exposed, is incised in a similar way, the ends of this incision being made continuous with those of that made in the anterior fornix. The peritoneum of the pouch of Douglas is liable to injury, but this accident is not of importance. In cases where the posterior lip must be divided high up, it is better to cut into the pouch and remove the peritoneal covering along with the portion amputated.

3. The clearing of the cervix from the cellular tissue above the *lateral fornices* is more difficult, on account of the firmness of the connective tissue and the presence of large branches of the uterine artery which enter at the sides. To prevent hæmorrhage, the tissues are transfixed with an aneurism needle and ligatured before cutting through between the ligature and cervix; or the tissue may be clamped in Wells' forceps and the forceps left on for forty-eight hours (*Lewers*).

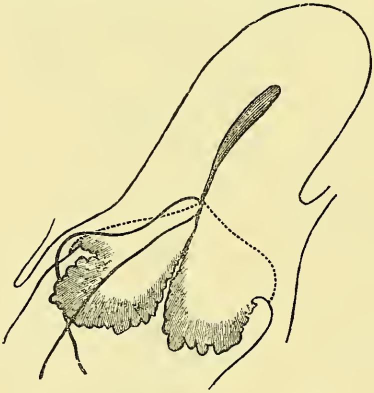

Fig. 291.

Line of incision and Position of Sutures in the Supra-vaginal amputation of the Cervix (*Schroeder*).

4. The cervix being thus made free all round, the knife is carried through its anterior wall at the desired height, *till* the *cervical canal is opened into*. The anterior vaginal wall is stitched to the anterior wall of the cervix (fig. 291). This prevents retraction of the cervix while the posterior wall is cut through and the amputation thus completed. The posterior vaginal wall is now stitched to the posterior lip of the cervix. The ends of the wound in the lateral fornices are closed with sutures which, if placed deeply, also control hæmorrhage. As the ureters retract, they are not in danger of being caught in the ligatures.

As regards the operation itself, Hofmeier reporting on 105 cases done in Schroeder's Clinic gives a mortality of 12·37 per cent.; as regards the cure of the disease, out of forty-seven cases, fifteen were without recurrence two years after the operation and ten had not been heard of; after three years twelve were well and after four years five. All the others were lost sight of or had a return of the disease. Lewers reports on ten cases he has done, all of which recovered from the operation: three had no recurrence till a year afterwards; and, in one of these, removal of the new growth in the stump with the cautery had given at least another year's immunity.

Amputation followed by caustics was the method advocated by Marion Sims.

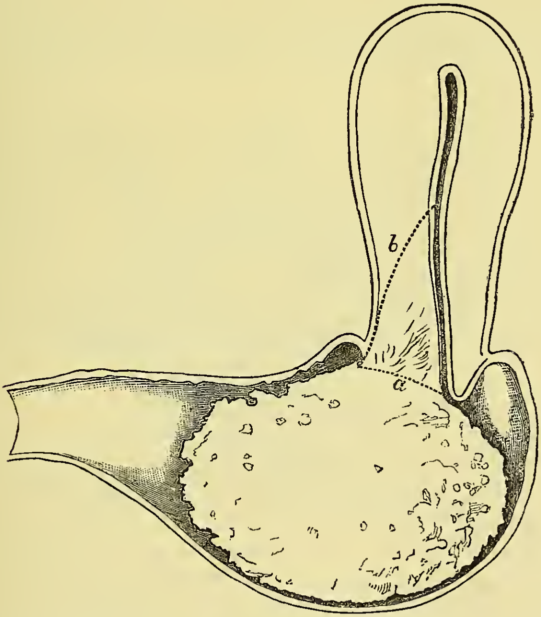

Fig. 292.
Excision of Epithelioma of the Cervix (*Marion Sims*). For letters see text.

1. The epitheliomatous mass is broken down and removed with the curette, or cut away with the scissors if it is of a sufficiently firm consistence. It is not merely removed as far as its base (dotted line *a*, fig. 292), but the bed of the tumour is exsected with the knife and scissors or scraped out with the curette as far as diseased tissue is present (dotted line *b*, fig. 292).
2. The cavity thus produced is cleaned out with sponges, and examined with the finger to ascertain that all indurated structure has been removed.
3. The edges of the cavernous opening are trimmed. The parts are sponged quite dry, and the cavity plugged with cotton wool squeezed almost dry out of either of the following styptic solutions; liquor ferri subsulphatis (1 part to 2 of water), or solution of carbolic (1 to 40) saturated with pulverised alum (1 to 12). The upper third of the vagina is packed with the same material, and the rest with cotton wool soaked in carbolic solution.

4. After an interval of five days, this plug is removed and the caustic introduced. Pledgets of cotton wadding soaked in a strong solution of chloride of zinc (ʒv to ℥i) and wrung dry, are packed into the scraped-out cavity; the upper part of the vagina is tamponed with wadding soaked in a solution of bicarbonate of soda. Morphia is given hypodermically to relieve the intense pain produced by the action of the chloride.

5. After another interval of five days, the cotton wool containing the caustic is removed. A cup-shaped greyish slough will be found under it and is easily taken away. The granulating surface beneath will cicatrize in a fortnight.

The results of this operation are said by Marion Sims to be more satisfactory than those which follow from the use of the knife with healing by the first intention. He mentions one case in which he removed an epithelioma of the anterior lip (represented in fig. 292) the size of a Sicily orange. A year afterwards the operation had to be repeated to remove a similar tumour from the posterior lip. Five years after this the patient was still in good health, though smaller growths had been removed in the interval.

Van de Warker has recorded three interesting cases treated by this method. He uses a stronger solution (equal parts by weight) of the chloride of zinc and a 30 per cent. solution of the bicarbonate with an ointment (1 part bicarbonate to three parts vaseline) to protect the genitals.

Fränkel[1] has tried this method in six cases which were considered inoperable, with the result that all were free for a longer or shorter period—one being without recurrence after seven years. After scraping and applying the actual cautery, he packs with iodoform gauze until the slough has separated; and *then* applies the chloride-of-zinc solution but leaves it on for only twelve to twenty-four hours at a time. The greyish leathery slough comes away in eight to ten days, and then dry iodoform-gauze packing is used again until the surface has healed.

Schramm[2] injects occasionally a solution of corrosive sublimate into the cancer-mass with the result that the discharge is lessened and the degenerative process is retarded. Scharlaus[3] used chromic acid to destroy recurrent growths after amputation; and the patient was well four years afterwards, having had a child in the interval.

EXCISION OF THE WHOLE UTERUS.

Freund's Operation.

To Freund of Strassburg is due the credit of having first thought out and carried into execution a method by which the whole uterus can be removed. This method has increased the possibility of a radical cure of malignant disease of the uterus, though the number of cases suitable for extirpation is more limited than we should have supposed. The uterus alone can be removed by it, not the glands or connective tissue in the pelvis to which the disease in the majority of cases soon spreads. But when the disease has originated in the body of the uterus, or beginning at the cervix has extended upwards into the uterus rather than into the vagina or the connective tissue, the *extirpation of the uterus* holds out the prospect of a radical cure. This may be done

A. By abdominal incision,
B. Through the vagina.[4]

Freund's Method.

A. BY ABDOMINAL INCISION (Freund's method). As the high mortality from this method (72 per cent.) has made most operators abandon it for the vaginal method, we shall merely indicate in what the operation consists.

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[1] *Centralb. f. Gyn.*, Bd. XII., S. 593.

[2] *Centralb. f. Gyn.* Bd. XII., S. 213.

[3] *Beitrage zur Geburts. Berlin.*, Bd. II., S. 23.

[4] A third method, which is a combination of these, has been so seldom used that it requires no notice here.

The abdominal cavity having been opened, the uterus is laid hold of and each broad ligament ligatured in three parts, the lowest ligature passing through the lateral fornix of the vagina. The Uterus is now cut away from the broad ligaments; and the knife carried through the peritoneum of the utero-vesical pouch and pouch of Douglas into the anterior and posterior fornices so that the whole organ is thus excised. The ends of the ligatures in the broad ligaments are brought through the hole in the roof of the vagina, in which a drainage tube is also placed.

The results of this method of extirpation are according to Gusserow 148 cases with a mortality of 71·6 per cent., according to Duncan 137 cases with a mortality of 72 per cent.[1]

B. Extirpation through the Vagina. Different operators have introduced various modifications, but these are only in detail. We describe the operation as performed by Martin.

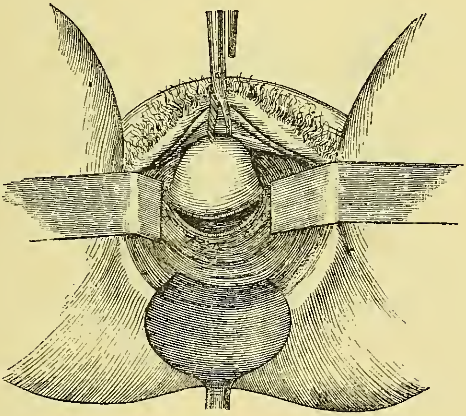

Fig. 293.

Vaginal Extirpation of the Uterus (*Martin*).

The cervix has been drawn downwards with forceps, the pouch of Douglas opened transversely, and row of sutures passed through vaginal fornix and peritoneum.

1. Place patient in lithotomy posture, empty bladder and thoroughly disinfect genital tract. Let assistants hold anterior and posterior vaginal specula and lateral retractors in position, draw down cervix with volsella and direct it forwards towards pubes. Make a transverse incision through the junction of vaginal mucous membrane with posterior surface of cervix. The pouch of Douglas is thus opened. Then sew the peritoneum and vaginal mucous membrane together by three or four sutures parallel to line of incision and slightly behind it (fig. 293).

2. Pass left index finger into pouch of Douglas and press left broad

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[1] Several cases of total extirpation of the pregnant cancerous uterus are on record. Sir Spencer Wells in 1881 and Zweifel in 1888 removed one at sixth month, patients recovering in both cases. Schroeder operated at full-time in two cases, and Bischoff in one. All three died.

ligament down against vaginal roof. With a large curved needle pass a suture through anterior part of left lateral fornix, through broad ligament above uterine artery, and out again through the vaginal roof close to the outermost suture of the posterior row (fig. 294). Pass a ligature in the same manner, also, on the right side. Then with scissors cut through the bases of the broad ligaments as high as ligatures reach, keeping close to uterus.

3. Draw cervix backwards, and at the line of junction of vaginal mucous membrane with its anterior surface, make a transverse incision down to muscular substance of uterus. Carefully separate bladder from uterus and open into utero-vesical pouch of peritoneum. Bring vaginal mucous membrane and peritoneum into close apposition by a transverse row of sutures applied as was done posteriorly.

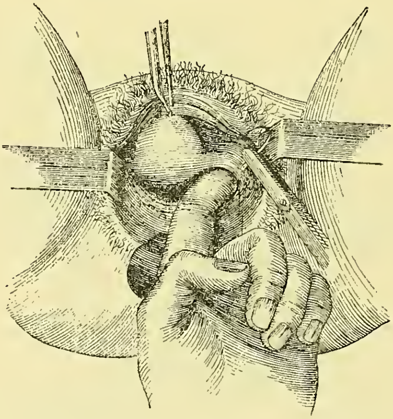

Fig. 294.

Vaginal Extirpation of Uterus (*Martin*).

Application of first ligature in lateral fornix to control vessels in base of broad ligament.

4. With volsella pull down fundus through pouch of Douglas as far as possible. The broad ligaments, and generally the tubes and ovaries, are thus brought into vagina.

5. Now ligature broad ligaments above the level of the uterine arteries. This is done by two or three sutures passed exactly as in the case of that first applied in the lateral fornix, only at successively higher levels in the vaginal roof. The uterus is then cut away, the tubes and ovaries being also removed when possible.

Thus the sutures are all tied on the vaginal surface, and they approximate the serous surfaces of broad ligaments and pelvic floor to one another as well as to the vaginal mucous membrane.

If a wide opening remains, it can be made smaller by a suture on each side. A rubber drainage-tube may be used or not. Dust wound with iodoform and place an iodoform-gauze tampon in vagina.

Czerny brings down fundus through opened-up *utero-vesical* pouch. Olshausen, Leopold and others do *not* draw fundus down, but gradually cut away uterus from broad ligaments after suturing the latter in successive stages from below upwards.

Fritsch operates in the same way, but ligatures the uterine arteries and cuts through base of broad ligaments before opening into peritoneum. Richelot, Péan, and others do not ligature the broad ligaments but apply a clamp to each one, which is removed in about forty-eight hours.

The mortality from the operation of total extirpation (including cases other than cancer) is given by Martin as 16·6 $^{\circ}/_{\circ}$ in 134 cases, by Hofmeier and Schroeder as 16·2 $^{\circ}/_{\circ}$ in 74 cases, by Fritsch as 10 $^{\circ}/_{\circ}$ in 60 cases, by Leopold as 6·2 $^{\circ}/_{\circ}$ in 48 cases, by Staude as 4·54 $^{\circ}/_{\circ}$ in 22 cases, and by Sänger as 8·3 $^{\circ}/_{\circ}$.

COMPARISON OF THE RESULTS OF AMPUTATION OF THE CERVIX WITH THOSE OF EXTIRPATION OF THE UTERUS.

In judging of the relative merits of these operations, we must take into account (1) the immediate result with regard to recovery from the operation, and (2) the ultimate result with regard to the non-recurrence of the disease.

(1.) *The immediate result.*

The mortality for amputation of the cervix with the Galvano-cautery is $7\frac{1}{3}$ $^{\circ}/_{\circ}$ (Pawlik's statistics, *v.* p. 491); with the knife, in 33 cases of Gusserow's 9·09 $^{\circ}/_{\circ}$, and in 136 cases of Schroeder and Hofmeier's 7·4 $^{\circ}/_{\circ}$.

We have seen, however, that although Schroeder's mortality in total extirpation was greater than in partial amputation, later operators have gradually reduced the death-rate in the major operation to as low a figure as 5 or 6 $^{\circ}/_{\circ}$.

(2.) *The ultimate result.*

(*a.*) In amputation of the cervix.

	BRAUN (PAWLIK). (*Galvano-Caustic*) 136 Cases.	SCHROEDER (HOFMEIER). (*High Amputation*) 115 Cases.
Died after operation . . .	10	18
Known to be free 1 year afterwards	33	50
,, 2 ,, ,,	26	40
,, 3 ,, ,,	—	28
,, 4 ,, ,,	—	21
,, 5 ,, ,,	—	11
,, 6 ,, ,,	—	5
,, 12 ,, ,,	2	—
,, 19½ ,, ,,	1	—

Of the cases not accounted for by this table, some had a return, while others were not followed up.

(*b.*) In total extirpation.

Post[1] of New York has collected over 700 cases performed before the end of 1887, in which the total death-rate was 24 °/o.

The results of the leading operators are as follows:—

Martin (1887).	*Fritsch* (1886).	*Leopold* (1887).	*Schroeder-Hofmeier* (1886).
Of 44 cases in years 1880–85, disease had returned in 13 (29·7 °/o) by 1887.	Of 53 cases in years 1883–86, disease had not returned in 20 (37·7 °/o), 10 months afterwards. Two cases had been free for 3 years, seven for 2–3 years, and eight for 1–2 years. The others had not been followed.	Of 37 cases in years 1883–87, disease had returned in 8 (21 °/o) within 1 year. Of the rest only 18 were heard from; and of these 12 had had no return for 1–2 years, and 6 for 2–3¼ years.	Of 46 cases in years 1878–85, 33 were watched for 1 year, and of these 13 (36·4 °/o) had return of disease; 23 were watched for 3 years, of whom 17 (74 °/o) had return; and 10 for 4 years, all of whom had return. The other cases were not followed.

Terrier of Paris reports 11 cases operated on in 1885. Of these, 4 were well after 2 years. The others had had a return within 16 months.

Taking the total and partial operations together, we find that Schroeder and Hofmeier have given immunity for at least four years to one-third of their patients. The results as regards recurrence are not nearly so good with total extirpation as with partial amputation, yet it must not be concluded that the former operation favours a return. In all cases in which the cancer was removed by partial amputation, total extirpation also would certainly have removed it and with (as is now established) as small a death-rate. The above-mentioned cases of partial operation must have been particularly favourable ones *i.e.*, in which the disease was distinctly localised and in an early stage of growth. In all such cases, the minor operation will be preferred. The great majority of cases, unfortunately, are operated upon when the disease has existed for some time and when there is uncertainty as to whether it has spread beyond the uterus even though that be not demonstrable by manual examination. It is evident, therefore, that in these cases, until we are able to diagnose more correctly, we shall operate in many cases where a return is certain.

Although women themselves often put off consulting a medical man owing to the slight disturbance caused by cancer in its early stage, there are many cases in which through ignorance or carelessness the practitioner allows the disease to advance until its exact limits can no longer be defined.

The character of the cancer must be taken into account in the prognosis as to the ultimate results; an extensive papillary cancroid of the vaginal portion giving the worst prognosis; cancer of the cervix a relatively better, and cancer of the vaginal portion the best.

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[1] *Am. Journ. Obst.*, Nov. 1887.

Comparison between Cancer of the Uterus and the disease elsewhere, as regards operative treatment.

Fritsch finds that recurrence after removal by total extirpation is less frequent than after similar removal from any other part of the body. He gives Von Volkmann's statistics of Cancer of the breast as follows :—

Out of 131 cases, return of the disease was observed

In 1	month	in	7	cases,
2–6	,,	,,	23	,,
7–12	,,	,,	12	,,
13–18	,,	,,	5	,,
19–24	,,	,,	6	,,
25–36	,,	,,	1	,, .

CHAPTER XLIII.

CARCINOMA OF THE BODY OF THE UTERUS.

LITERATURE.

Breisky and Eppinger—Prager med. Wochenschrift, S. 78, 1877. *Gusserow*—Neubildungen des Uterus, S. 254: Stuttgart, 1885. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 295. *Simpson, Sir J. Y.*—Selected Obstetrical and Gynecological Memoirs, edited by Watt Black, p. 769. *Veit*—Zeitschrift. für Geburts. und Gyn., Bd. I., S. 467. Zur Kenntniss des Carcinoma corporis uteri: Centralb. f. Gyn., Bd. X., S. 173.

PATHOLOGY AND ETIOLOGY.

Carcinoma affects the body of the uterus much more rarely than the cervix; in only 13 out of 686 cases of uterine cancer, that is in rather less than 2 per cent., was the disease situated in the body of the uterus (*Schroeder*).

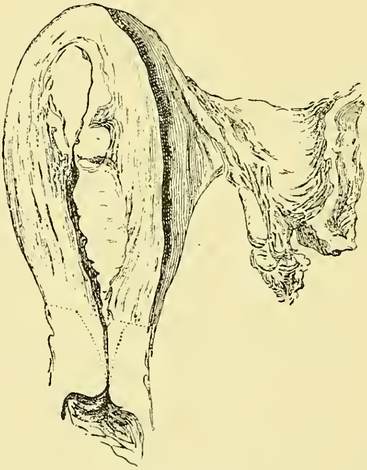

Fig. 295.

Uterus extirpated for Cancer; no recurrence five years after operation (*Hofmeier*).

Its rarity is apparent from the fact that Gusserow, after a careful survey of the whole literature, has collected but 80 cases.

As in the cervix, the disease originates either in the substance of the walls of the uterus or in the mucous membrane. In the former case, it begins as localised nodules which grow rapidly and produce bulging of the mucous membrane or of the peritoneal coat but do not tend to ulcerate. When in the mucous membrane, it causes a uniform swelling (fig. 295) or, more usually, projects in polypoidal masses (fig. 296). Fig. 295 from Hofmeier, shows a uterus extirpated for cancer; the disease had not recurred within five years after the operation.

By Eppinger and Ruge the disease has been directly traced to the epithelium of the uterine glands; these first hypertrophy, and then their proliferating epithelium passes into carcinomatous epithelial cells. The new-formation ulcerates, so that the wall of the uterus becomes converted into an excavated surface with a hard base. Adhesions rapidly form with neighbouring organs, while secondary deposits may develop in the peritoneal cavity.

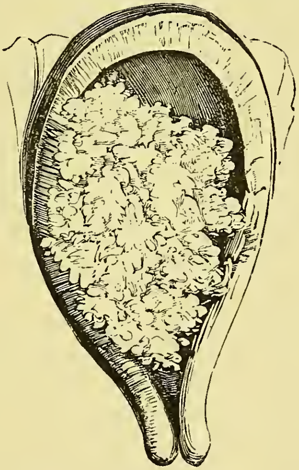

FIG. 296.

CARCINOMA OF THE BODY OF THE UTERUS. The uterine cavity is increased in size but the cervix is undilated (*Sir J. Y. Simpson*).

As to *Etiology*, what has been said of carcinoma of the cervix applies here with two additional facts. (1) It occurs rather later in life than cancer of the cervix; and (2) is more frequent in nulliparæ.[1]

SYMPTOMS AND DIAGNOSIS.

Again, as in carcinoma of the cervix, the symptoms are pain, hæmorrhage, and fœtid discharge. 1. *Pain*, in contrast with carcinoma of the cervix, is always an early symptom. Sir J. Y. Simpson drew attention Pain.

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[1] Taking Veit's two series of cases together, we have out of 80 cases, 31 between 50 and 60 and 21 above 60 years of age (cf. table in fig. 283); and of 72 cases, 38 were childless.

to periodic attacks of severe pain as characteristic of cancer of the body. This is not always present and is probably due to uterine contractions set up by accumulation of secretion (*Veit*). 2. *Hæmorrhage* is also present at an early stage; it takes the form of profuse menorrhagia, because the mucous membrane from which the menstrual flow takes place is diseased. 3. *The discharge* is usually profuse and becomes after a time fœtid. Sometimes it is watery and not offensive; rarely is it altogether absent.

Hæmorrhage.

Discharge.

On vaginal examination, the cervix is found to be either normal (fig. 296) or dilated. The uterus is enlarged, and may be freely movable or may be fixed by adhesions. The sound shows the cavity to be enlarged and may reveal irregularity of the mucous membrane; its introduction is followed by hæmorrhage. The condition of the mucous membrane is more precisely ascertained by examination *with the finger after dilatation of the cervix* with a tent. In the majority of cases, certainty of diagnosis is possible only through *microscopic examination* of fragments removed by the curette. Should these show merely hypertrophied glands, we must remember that this is sometimes a transition stage to malignant disease. Typical carcinomatous cells are seen at fig. 285.

The *Differential Diagnosis* must be made from—

Portions of retained placenta,
Sloughing submucous fibroid,
Hæmorrhagic endometritis.

These conditions have been already described. As to the first of these we note that carcinoma sometimes develops during the puerperium. In three cases observed by Chiari, the development of carcinoma was directly connected with the puerperium and ran a rapid course to a fatal termination within six months after the birth of the child.

During the period of sexual activity, differential diagnosis is often extremely difficult; rapid growth and development of peritonitis fixing the uterus, point to malignant disease. After the menopause, the recurrence of hæmorrhage is an important diagnostic. The microscope is, when available, the most reliable guide.

TREATMENT.

As to the treatment of the symptoms, this is the same as in Carcinoma of the Cervix (*v.* Chap. XLII.). As to the treatment of the disease, the scraping away of the polypoidal masses with the curette or sharp spoon gives temporary relief from the hæmorrhage and discharge. The only hope of cure lies in extirpation of the uterus (*v.* p. 494).[1]

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[1] Of 7 cases (1 by Schroeder) done by Veit, 1 died after operation; and of 4 cases followed, 1 had recurrence in first year, 2 in second, and 1 not after three years.

CHAPTER XLIV.

SARCOMA UTERI.

LITERATURE.

Chroback—Beitrag zur Kenntniss des Uterussarkoms: Arhiv f. Gyn., Bd. IV., S. 549. *Clay, J.*—On diffuse Sarcoma of the Uterus: Lancet, Jan. 1887. *Galabin*—Lond. Obst. Trans., Vol. XX. *Gusscrow*—Die Neubildungen des Uterus, S. 158: Stuttgart, 1885. *Jacubash*—Vier Fälle von Uterussarcom: Zeitschrift f. Geburts. u. Gyn., Bd. VII., Hft. I. *Kunert*—Ueber Sarcoma Uteri: Arch. f. Gyn., Bd. VI., S. 29. *Rogivue*—Du Sarcôme de l'utérus: Inaug. dissert., Zürich 1876. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 320: Leipsic, 1886. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, p. 240: Edin., 1880. *Spiegelberg*—Sarcoma Colli Uteri hydropicum papillare: Archiv f. Gyn., Bd. XIV., S. 178. Ein weiterer Fall: Ibid., Bd. XV., S. 437. *Thomas*—Diseases of Women, p. 566, Lond. 1880; and Sarcoma of the Uterus, Lond. Obst. Journ., Vol. II., 1875, p. 437. *Virchow*—Die Krankhaften Geschwulste: Bd. II., S. 350. *Winkler*—Ein weiterer Fall von Sarcoma papillare hydropicum cervicis et vaginæ: Archiv f. Gyn., Bd. XXI., S. 309. For a full *resumé* of the earlier literature, see Gusserow and A. R. Simpson; and, for recent literature, the Index in the Appendix.

Nature of Sarcoma.

By sarcoma we understand a *connective-tissue* tumour of an embryonic type. As we trace back carcinoma to the epithelium and true myoma to the muscular fibre, so we trace back sarcoma to the connective tissue.

For the recognition of sarcomata as of connective-tissue origin and the limitation of the term to malignant tumours of this type, we are indebted to Virchow. Formerly they were known in English literature as "recurrent fibroids;" the existence of this form of tumour in the uterus was recognised and fully described by Hutchinson (1857).

PATHOLOGY.

Unlike carcinoma, sarcoma rarely occurs in the cervix; in the larger proportion of cases it is in the *body* of the uterus.

It occurs in two forms :—

1. Diffuse sarcoma of the mucous membrane;
2. Circumscribed fibrous sarcoma,

Diffuse Sarcoma.

The *diffuse sarcoma of the mucous membrane* arises from the subepithelial connective tissue. It appears as a general swelling of the mucous membrane which becomes soft and crumbly, or as irregular foldings or knobby projections into the uterine cavity; sometimes these projections have a polypoidal and apparently circumscribed character (fig. 297) so that this form passes insensibly into the fibrous. The masses have a greyish-white brain-like appearance, and soft pulpy consistence. The mucous membrane may be broken down but is not deeply excavated as in carcinoma. On microscopic examination the mucous membrane is seen to be infiltrated with masses of closely-set round cells, more rarely spindle-cells. Epithelial-cell proliferation often complicates this form of sarcoma and brings it into close relation to carcinoma. Klebs has proposed to call such forms carcino-sarcomata.

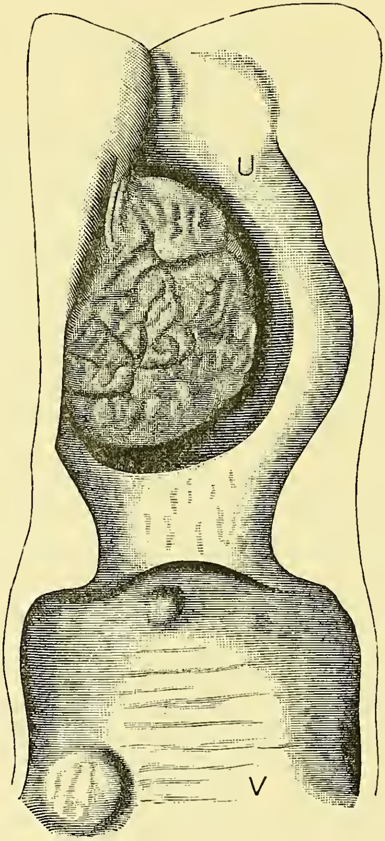

Fig. 297.

Sarcoma Uteri with Tumours in the Vagina—from a specimen in the Pathological Institute at Strassburg (*Gusserow*).

Circumscribed Sarcoma.

The *circumscribed fibro-sarcoma* arises in the muscular coat; like the fibroid it may be submucous, interstitial, or sub-peritoneal, and is found usually in the body, rarely in the cervix. The tumours are of a firm consistence, and feel like knots in the muscular wall of the uterus or project as polypi into its cavity; they thus resemble small fibroids, but *have no capsule.* Microscopically they consist of a localised sarcomatous —generally round-celled—infiltration (fig. 298).

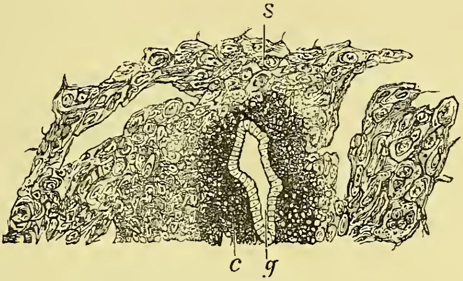

FIG. 298.
MICROSCOPIC SECTION OF THE MUCOUS MEMBRANE OF THE UTERUS IN A CASE OF SARCOMA (*Schroeder*).
S Sarcomatous tissue; *c* small-celled infiltration; *g* uterine glands.

In some cases it has been alleged that sarcoma is a *degeneration of a fibroid tumour*, as in the following specimen described by A. R. Simpson. "On section it presented a uniformly smooth surface of pale-pinkish colour, with some islands in it presenting the familiar cotton-ball structure and clear white glistening aspect seen on section of an ordinary fibroid tumour of the uterus, and separated from the softer surrounding tissue by a connective-tissue capsule (fig. 299). The larger part of the tumour was composed of fusiform nucleated cells, with an intercellular

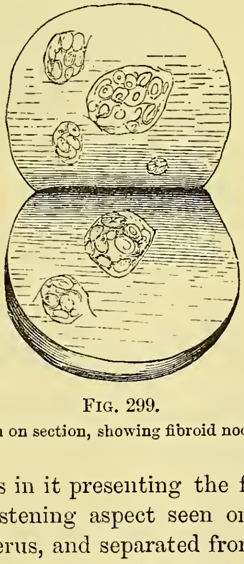

FIG. 299.
SARCOMA UTERI, seen on section, showing fibroid nodules (*A. R. Simpson*).

matrix having a fibrillated appearance, and running for the most part in small sections in parallel directions." A portion of the tumour, probably then a fibro-myoma, had been removed five years previous to this; a third portion of the tumour, removed four years subsequent to this, showed only sarcomatous tissue. A similar case is reported by Ballantyne, with microscopic sections.[1] Chroback and Müller[2] also have traced the development of sarcoma in tumours which were originally undoubted fibroids. There is therefore no doubt that this is one mode of origin of fibro-sarcoma; whether (as Schroeder and Kunert have suggested) this is always the origin, is as yet undecided.

Secondary nodules may form in the vagina (fig. 297) and peritoneal cavity. Sometimes the peritoneum is affected by continuous spreading of the new growth outwards towards the peritoneal covering; here it causes adhesions, through which the sarcomatous infiltration may extend to other organs (*Gusserow*). A. R. Simpson records a unique case in which the infiltration spread along the mucous membrane of the Fallopian tubes (fig. 300), so that from their fimbriated ends there projected "rounded masses, having the appearance of the thrombus projecting from a small vein into a larger trunk." The uterus was of the size of a four-months' pregnancy.

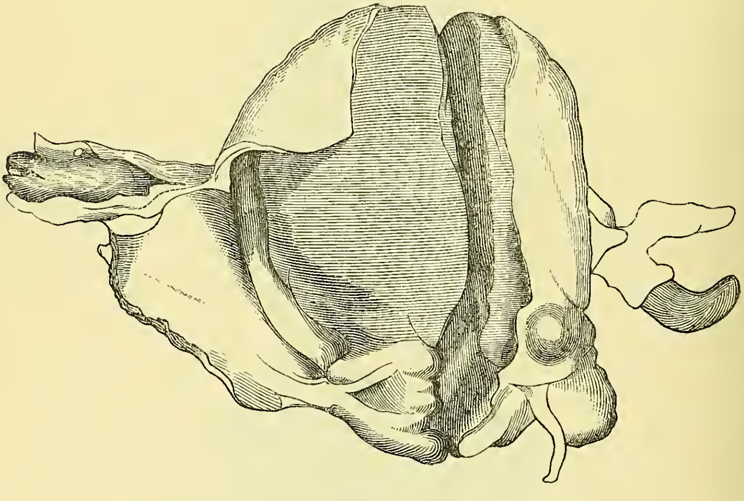

FIG. 300.

SARCOMA UTERI INVADING THE FALLOPIAN TUBES and projecting from their fimbriated ends (*A. R. Simpson*).

Co-existence of Inversion of Uterus.

A. R. Simpson draws attention to the frequency of *inversion of the uterus* as the result of sarcoma. We referred to it as a rare complication of pediculated subucmous fibroid tumours. In sarcoma, it appears to occur more frequently—in 4 out of 48 cases. He attributes this to the paralysis of the muscular wall of the uterus through sarcomatous infiltration and to the peculiar dilatability of the cervix observed in some cases.

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[1] *Edin. Med. Jour.*, Nov. 1884.

[2] Zur operativen Behandlung der Uterusmyome: *Archiv f. Gyn.*, Bd. VI., S. 125.

Sarcoma of the Cervix.

Sarcoma of the cervix is rare; in Winkler's paper, eight cases are referred to besides his own. Two of these were spindle-celled, the rest round-celled sarcoma. A special form has been described as Sarcoma papillare hydropicum cervicis. It grows as a papillary tumour which fills the vagina and may project outside the vulva. The cells are embedded in an abundant intercellular substance which stains faintly, is granular and traversed by delicate threads. It has been erroneously described as a myxo-sarcoma; in Spiegelberg's cases, it was shown that this intercellular substance was not mucin but coagulated lymph.

Large vascular spaces may form in their substance—as occurs in fibroid tumours; in a case recorded by Jacubash, the bursting of such a vascular tumour into the peritoneal cavity proved suddenly fatal.

Metastatic Deposits.

Metastatic deposits, though rare, are found more frequently in fibro-sarcoma than in diffuse spreading sarcoma. They have been found in the lymphatic glands, lungs, liver and vertebræ.

ETIOLOGY AND FREQUENCY.

Of the reason why a source of irritation should lead the connective tissue to produce a sarcomatous new-formation, we know as little as why the same cause produces a carcinomatous new-formation from the epithelium.

Frequency.

As to its frequency, a sufficient number of cases has not yet been collected to form any generalisation. It is, however, so rare that every carefully observed case which has been authenticated by microscopic examination should be placed on record. Gusserow has collected only 73 cases.

Influence of Age.

Age has the same predisposing influence as in fibroma and carcinoma. Adding to Gusserow's cases, 8 which we have collected from the literature of the last three years we find that

4 were under 20,
5 ,, between 20 and 30,
17 ,, ,, 30 ,, 40,
31 ,, ,, 40 ,, 50,
19 ,, ,, 50 ,, 60,
4 ,, ,, 60 ,, 70,
1 was above 70.

Sterility a result.

The number of sterile patients among those affected with sarcoma (25 out of 63) is noteworthy; in this respect it contrasts with carcinoma[1] (*Gusserow*).

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[1] In 74 cases of sarcoma, 25 were sterile, and 16 had less than 3 children.

SYMPTOMS.

The following conditions characterise the early stage, in which the patient seeks advice :—

1. Hæmorrhage,
2. Absence of pain,
3. Watery non-offensive discharge,
4. Cachexia.

Hæmorrhage. *Hæmorrhage* appears first as increase of the menstrual flow, or as irregular hæmorrhages after the menopause. As the new-formation *does not ulcerate* rapidly like carcinoma, the increased menstruation is due to hyperæmia of the mucous membrane (*Clay*).

Pain. The *absence of pain* in the early stage is remarked on by Clay and A. R. Simpson; in this respect it differs from intra-uterine cancer. According to Gusserow, on the other hand, pain is frequently present and that of an intense and rending character. This apparent discrepancy of opinion may be explained by the varying progress of the infiltration. In the spreading of carcinoma, we noted that pain was most severe when the disease was extending upwards and compressing the nerve endings in the uterus and connective tissue.

Discharge. The free rice-watery discharge has a slight odour but is not nearly so offensive as in carcinoma; this is due to the fact that there is not the same rapid ulceration and necrosis of tissue. When the disease has progressed further, the discharge becomes equally fœtid. The presence in the discharge of *greyish-white shreds*, like particles of brain matter, is diagnostic; under the microscope these are seen to consist of small portions of sarcomatous tissue.

Cachexia. *Cachexia* is of importance as it helps us to distinguish developing sarcoma from a non-malignant polypus; the drain from the latter may make the patient gradually anæmic; but there are not the loss of flesh, the loss of appetite and the rapid failure of strength, which point to malignant disease.

DIAGNOSIS.

If the tumour projects through the os, the diagnosis is not difficult. The age of the patient with the symptoms given above and the existence of a *soft friable* pediculated tumour which springs *from the body* of the uterus, will point to the diagnosis; a portion, detached with the nail, shows the characteristic microscopical structure. When nothing projects through the cervical canal, we try to dilate it with the finger, or, if this fails, with a sponge tent or the rapid method described at p. 458. The finger recognises a soft friable condition of the mucous membrane, or a distinct polypoidal tumour, or a localised thickening in the walls.

The uterus is in some cases distinctly enlarged and may reach half-way to the umbilicus or lie retroverted; in the early stages it is movable, but it soon becomes fixed.

The sound shows the cavity to be enlarged; its use causes hæmorrhage.

Differential Diagnosis.

The differential diagnosis is here often very difficult, as these conditions are also present in—

Chronic endometritis (hæmorrhagic type),
Small fibroid tumours (interstitial or polypoidal),
Carcinoma.

Curetting the surface, with microscopic examination of the scrapings, will help us in the first case.

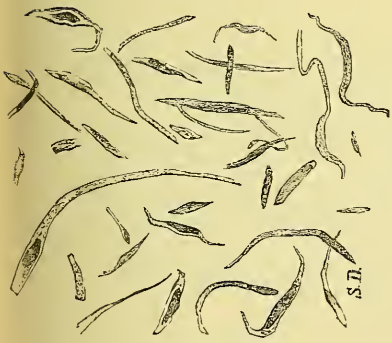

FIG. 301.

SCRAPINGS FROM A FIBROID TUMOUR to show the size and form of the muscular fibre, their rod-shaped nuclei—stained, $\frac{250}{1}$; drawn by S. Delépine.

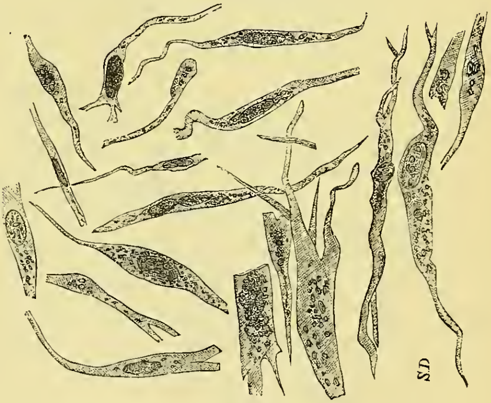

FIG. 302.

SCRAPINGS FROM A SPINDLE-CELLED SARCOMA to show the larger size of the spindle cells and their oval nuclei—stained, $\frac{250}{1}$; drawn by S. Delépine.

The removal of the polypoidal mass, with the finger nail or nail-curette, will enable us to examine its nature; the possibility of both conditions being present, polypoidal fibroid + commencing sarcomatous degeneration, must be remembered. With an interstitial thickening, we can only watch the progress of the case.

In carcinoma of the fundus, there is generally excavation of the uterine wall and the base of the ragged surface is harder than in sarcoma. The examination of scrapings is not always decisive, as the cells found in sarcoma sometimes closely resemble epithelial cells.

In all cases of doubt we must watch for a few months, when the *rapid growth* of the tumour or the *development of cachexia* will clear up the case.

PROGNOSIS.

The prognosis is grave. Compared with carcinoma, its development is not so rapid nor are the symptoms of pain and offensive discharge so aggravated in the early stage. In two of the cases recorded by A. R. Simpson the patient survived for four years after the diagnosis of sarcoma was made out, and Gusserow mentions a case where the course was prolonged for ten years.

The temporary relief procured by removal is longer of duration than in carcinoma. No case of radical cure is, as far as we know, recorded; after removal it reappears at periods varying from two to fourteen months (*Clay*). When it returns, the development of the new tumour is more rapid than that of the first growth.

As to the communication of the prognosis to the patient and friends, see under Carcinoma.

TREATMENT.

The tumour should be removed as soon as we suspect malignancy. Even when there is doubt, its removal will clear up the case.

The cervix should be well dilated so as to allow the finger to pass freely into the uterus. Gradual dilatation is preferable; injury of healthy mucous membrane in dilating or curetting should be avoided, as sarcomatous cells have become engrafted on a fresh wound surface.

When circumscribed and polypoidal, remove it with the finger nail or nail curette. After its removal apply carbolic acid thoroughly to its base.

When diffuse, curette the uterus. Continue the scraping till all the loose tissue and irregularities of the mucous membrane are removed. After curetting the surface of the uterus, examine with the finger to ensure that all is removed and apply carbolic acid freely. When the os is widely dilated and the seat of the growth low down, cauterisation with Paquelin's cautery would be even more effectual. Clay injected perchloride of iron after curetting, and without any bad result; the application of the caustic on a rod is safer.

Extirpation of the uterus offers the only hope of radical cure (*v.* p. 494). Dawson[1] has recorded a case of extirpation for sarcoma of the cervix.

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[1] *Amer. Journ. Obstet.* 1885, p. 1184.

SECTION VI.

AFFECTIONS OF THE VAGINA.

These we shall consider in the following order :—

Chapter XLV. Atresia Vaginæ.
,, XLVI. Vaginitis : Vaginismus : Tumours.

CHAPTER XLV.

ATRESIA VAGINÆ.

LITERATURE.

Barnes—Diseases of Women, p. 219: London, 1881. *Breisky*—Die Krankheiten der Vagina: Stuttgart, 1879. *Delaunay*—Étude sur le cloisonnement transversal du Vagin, etc.: Paris, 1877. *Dohrn*—Angeborne Atresia vaginalis: Archiv für Gynäk., Bd. X., S. 3. *Duncan, J. Matthews*—Case of so-called Imperforate Hymen: Lond. Obst. Tr., Vol. XXIV. *Emmet*—Principles and Practice of Gynecology, p. 188: Philadelphia, 1884. Congenital Absence and Accidental Atresia of the Vagina, etc.: Trans. Am. Gyn. Soc., II., p. 437. *Fasola*—Contributo allo studio dell'origine dell'imene, a proposito di un caso di ematocolpo per mancanza della parte inferiore della vagina e dell'imene: Annal di Ostet., 1885, p. 146. *Fuld*—Salpingotomie wegen Hämatosalpinx bei Gynatresie: Archiv f. Gyn., Bd. XXXIV., S. 191. *Leopold*—Blutansammlung im Verschlossenen Uterovaginalkanale und die Salpingotomie: Archiv f. Gyn., B. XXXIV., S. 371. *Puech, A.*—Des Atrésies complexes des voies génitales de la Femme: Ann. de Gynécologie: Paris, 1875. *Simpson, Sir J. Y.*—Diseases of Women, p. 256: Edin. 1872. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, p. 195: Edin. 1880. *Thomas*—Diseases of Women: London, 1882, p. 220. See Index of Recent Gynecological Literature in the Appendix.

Definition. Atresia (ἀ-τρῆσις, non-perforation) has been already defined as occlusion of the genital tract where the obstruction is complete and leads to accumulation of menstrual blood or mucous secretion. This occurs at three places—the *hymen*, the *vagina*, and the *cervix uteri*. Atresia of the *cervix* has been already described (*v.* Chap. XXVI.). Accumulation of blood in one-half of a *septate uterus or vagina* will be considered by itself at the end of this Chapter.

PATHOLOGY.

1. Atresia Hymenalis.—The structure of the normal hymen has been already described (page 6). In atresia hymenalis it forms a continuous membrane, is thicker and of an almost cartilaginous toughness; this explains the rarity of spontaneous cure by rupture of the membrane. This condition is produced by the occurrence of inflammatory adhesion of the folds after their formation, that is after the nineteenth week of fœtal life. When the vagina is distended with menstrual blood, the hymen bulges forwards.[1] As the menstrual blood accumulates, the vagina distends so as to form a tense membranous-walled sac nearly

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[1] Blood extravasation occurred into the labia in Davy's case. *Lancet*, 1886, II., p. 1171.

filling the pelvis, and with a smaller firmer body (the undilated uterus) rising from its upper surface (*v.* fig. 305). If the tension be not relieved, the cervix next becomes dilated and may rupture. Finally the uterus itself becomes opened out, though this does not occur till late.

During this period, accumulations of blood may take place in the Fallopian tubes in the form of diverticula, usually situated towards the fimbriated end (figs. 303 and 304). These are not produced, as we should suppose, by a simple reflux of the blood from the distended uterus into the tubes but by hæmorrhage from the mucous membrane of the tubes themselves (*Schroeder*); the uterine end of the Fallopian tube is sometimes undilated or even entirely closed. Blood may escape gradually from the fimbriated end of the tube, and set up a localised peritonitis matting down the tube and uterus; a hæmatocele is sometimes thus produced.

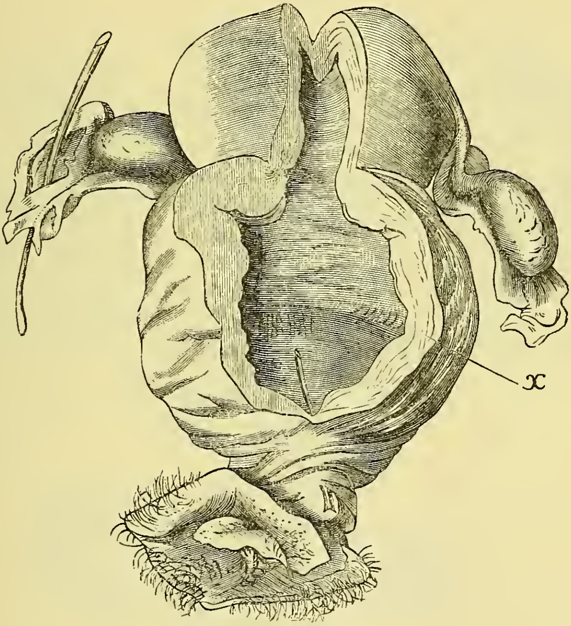

FIG. 303.

ATRESIA VAGINÆ, SEEN FROM BEHIND. Thickness of obstruction (through which a probe is passed) 3-4 *mm.*; of vaginal wall below atresia 2-3 *mm.*, *above it* (*at* x) 6 *mm.* Dilatation of the body of the uterus is small compared with the common cavity formed by cervix and upper portion of vagina. Left Fallopian tube markedly dilated, with no distinct flexion on it, and changed at its free end into a *thin-walled blood sac which had burst.* Right tube undilated. (*Breisky*)

2. ATRESIA VAGINALIS. The *thickness of the obstruction* varies in different cases, according to the extent of the original obliteration and the thinning produced by the pressure from above. The *dilatation of the*

vagina above the obstruction is remarkable; it may form a tumour filling the pelvis, pressing on the bladder and rectum, and raising the uterus above the brim; the walls become *hypertrophied* as is well seen in the preparation represented in fig. 303, taken from a patient who died on the same day as the operation for atresia was performed.

Seat of Obstruction.

The *seat of the obstruction* is most frequently in the *lower third* of the vagina. This condition may be mistaken for imperforate hymen; as the wall of the sac, bulging through the hymeneal orifice, becomes adherent to the hymen which appears as a mere fringe on the bulging membrane. There is not, however, the same distension of the vulvar orifice and perineum as in atresia hymenalis. *Atresia of the whole vagina* is usually associated with imperfect development of the uterus (*Breisky*).

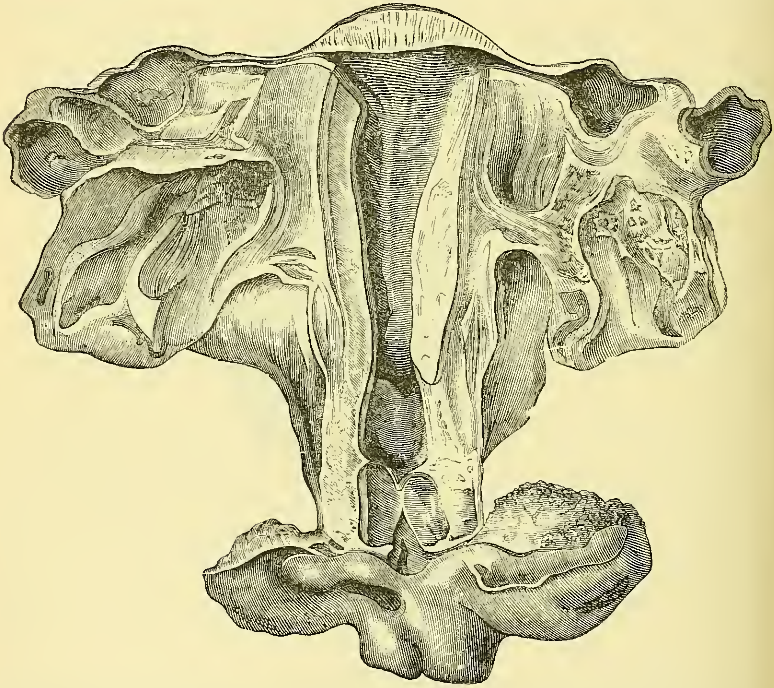

Fig. 304.

Case of Double Atresia. The *lower* affects the hymen and was *acquired;* above this was a cavity one inch long which contained purulent debris: the *upper* obstruction was one inch thick and was *congenital;* above it is the dilated uterus and cervix. The Fallopian tubes contain blood-sacs with small rents in their walls (*Breisky*, case reported by Steiner).

Atresia may exist at more than one point in the vagina. The specimen represented in fig. 304 illustrates this. It has this further interest that the lower atresia—at the vaginal orifice—was *acquired*, the result of a fall on a block of wood when the patient was two years old; the upper atresia was *congenital.* The accumulation of menstrual blood in the upper sac called for operative interference when the patient was seventeen years of age. The lower sac contained purulent matter. On the fifteenth day after the operation, death occurred from septic peritonitis.

Character of retained Blood.

The character of the *retained menstrual blood* is peculiar. It is of a brownish chocolate-red colour, of a thick treacle-like consistence, and contains no coagula. Microscopically, it shows shrivelled red blood-corpuscles, flat epithelial cells, mucous corpuscles, extravasated blood-pigment, and granular debris. The mucus prevents coagulation; part of the fluid portion is probably reabsorbed, since the quantity removed is less than the sum of what we should expect from the successive periods passed.[1]

ETIOLOGY.

Congenital Atresia.

1. Atresia may be *congenital*, due to non-development of a part of the canal or its subsequent closure during fœtal life.

Atresia hymenalis implies that the hymeneal folds were developed (at the nineteenth week) but afterwards became blended into a continuous membrane.

Atresia of the vagina behind the hymen is, according to Dohrn, due to the fact that (at the eighteenth week of fœtal life) the walls of the genital canal become closely approximated behind the site of the hymen, so that closure of the vagina is especially favoured in that part.

Atresia of the middle or upper third implies the development of the ducts and their coalescence into a vagina, with a subsequent occlusion due perhaps to inflammation (*Breisky*).

Complete absence of the vagina or its representation by a fibrous cord is due to the non-development of the ducts of Müller; *absence of the lower third* is occasioned by the non-extension of the ducts downwards so as to open into the cloaca.

Acquired Atresia.

2. Atresia is also *acquired;* that is, it arises during life. The most important causes which produce this condition are the following:—

Sloughing and subsequent cicatrisation after labour;[2]
Sloughing from impaired vitality in typhus, scarlet-fever, small-pox, and cholera;
Cicatrisation after injuries received in childhood;
Superficial inflammation of the mucous membrane, leading to adhesion of apposed surfaces.[3]

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[1] Oliver gives Bedson's chemical analysis of the retained blood in a recently reported case: "It gave the spectrum of reduced hæmatin, and contained ·6 p.c. of urea; 100 c.c. contained total solids 7·65 grms., organic compounds 6·93 grms., mineral compounds ·72 grms. In the solids were found salts, for example, chlorides, sulphates and phosphates, and such bases as iron, calcium, magnesium and sodium: *Brit. Med. Journ.*, 1888, II., p. 1160.

[2] As in the cases recorded by Holdsworth (*Lancet*, 1883, I., p. 949) and Cross (*Amer. Journ. Obstet.*, 1883, p. 809, and 1886, p. 802).

[3] As in the case recorded by More Madden (*Dublin Med. Journ.*, LXXV., p. 158), in which it developed in a multipara after a miscarriage.

The commonest form of congenital atresia is due to imperforate hymen; of acquired, is due to cicatrisation of the upper part of the vagina and cervix after labour.

SYMPTOMS.

As congenital atresia is productive of bad results only in so far as it impedes the menstrual flow, symptoms do not arise till puberty. Should menstruation not take place at puberty, the condition may not attract attention till the patient enters married life.[1] Cases are however on record in which the accumulation of mucus has called for operative interference even in childhood.

Symptoms arise at Puberty.

At puberty the patient experiences menstrual molimina without the appearance of a discharge. As the vaginal sac distends, pain is felt in the pelvis at first only at the periods and then more continuously. With this there is also constitutional disturbance. The periods of suffering become more protracted, the intervals of relief shorter. When the dilated vagina presses on the bladder and rectum, it causes difficulty in micturition and defæcation. The abdomen swells and this, with the amenorrhœa, causes suspicion of pregnancy which is sometimes the occasion for seeking advice. If the case is left to itself it terminates fatally through rupture of the uterus or cervix (usually the latter) or of a blood sac in the Fallopian tube, or through a simple or septic peritonitis independently of rupture. In some cases, the obstructing membrane has given way by rupturing (in acquired atresia) or sloughing (in the congenital form). But even this is not a favourable termination, as the risks consequent on operative interference are still more likely to ensue when the hymen ruptures of itself.

DIAGNOSIS.

The importance of physical diagnosis will be evident from the following case. "A. B., æt. 16, unmarried, has for twelve months suffered from pain in the pelvis and back, with occasional acute exacerbations accompanied by nausea and vomiting. She has been treated for inflammation; and mercurial ointment had been applied to a swelling which had appeared in the left groin, on the supposition that it was an enlarged gland." Examination per rectum showed a condition similar to that seen at fig. 306; the swelling in the left groin was the elevated uterus.

The practitioner will often ask himself whether a vaginal examination is necessary. On the patient's returning several times and there being nothing in the constitutional state (phthisis, chlorosis) to explain the amenorrhœa, tell the friends that there is no apparent cause for the non-appearance of menstruation except on the supposition of a mechanical obstruction to its outflow. If there be pain in the pelvis and marked constitutional disturbance, the reasons for demanding an immediate examination will be evident. The conditions found in the various forms of atresia will be easily understood by studying figs. 305 to 308. The external genitals are first examined; a wide urethral orifice may be mistaken at first glance for the vagina, as in *atresia hymenalis* the urethral orifice is more patulous than it is normally (*Oldham*); the hymen is seen bulging forwards at the ostium vaginæ. The finger is passed into the rectum and feels that the anterior wall is made to bulge by a tense elastic sac. On bimanual (recto-abdominal) examination, this sac is felt to be equally distended and to fill the pelvis; it may extend into the abdomen as far as the umbilicus. The feeling of the sac is quite characteristic and is like that of a tense india-rubber ball; on its upper surface, the uterus is felt as a small firmer tumour.

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[1] Zinnstag records a curious case in which an apparently imperforate hymen was not observed until labour set in; there must have been a perforation (to account for conception) at one time, but it had closed subsequently: *Centralb. f. Gyn.*, XII., S. 219. Doléris reports a similar case: *Archiv. de Toc.* 1886, p. 135.

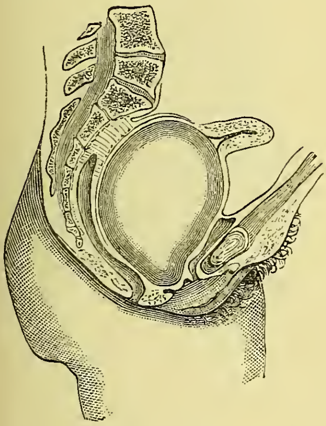

Fig. 305.

Atresia Hymenalis (*Schroeder*).

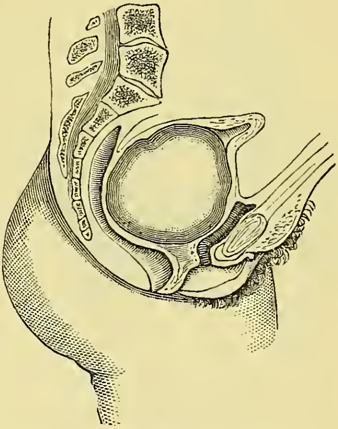

Fig. 306.

Atresia Vaginæ—lower third (*Schroeder*).

In *atresia vaginæ* the condition is the same, except that the hymen does not bulge and that the sac does not extend so low down.

Diagnosis from Pregnancy.

Atresia of the cervix (figs. 307, 308) might be mistaken for early pregnancy; as the amenorrhœa and the distended uterus are present in both cases. But the condition of the cervix, the form of the uterus, and specially the characteristic tense feeling of the tumour, enable us to distinguish it from a pregnant uterus. Malignant tumours (sarcomata) have a similar elastic consistence, but with them we should not have amenorrhœa.

From Sarcoma.

It is not in all cases easy to say whether the atresia be congenital or acquired. The existence of other malformations would favour the former view, of cicatrices beside the obstruction the latter. There will also be a greater thickness of tissue felt between the urethra and rectum in the acquired form, corresponding to the obliterated vaginal canal.

Estimation of Extent of Atresia.

In atresia vaginæ it is important to estimate the distance to which atresia extends, so that we may know how much tissue we must cut through to reach the sac or the cervix uteri. This is best done by passing the index finger into the rectum till the tip is on the place where the bulging of the sac begins or where the projection of the cervix is felt; the thumb is at the same time passed into the ostium vaginæ till it reaches the obstructing membrane; the thickness of the latter can thus be estimated.

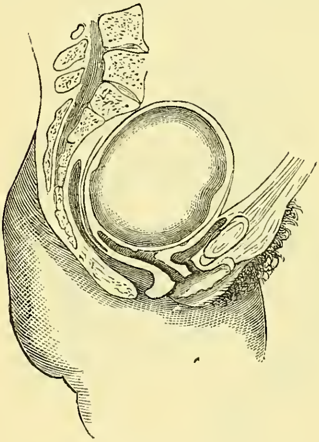

Fig. 307.
Atresia of Cervix at Os Externum (*Schroeder*).

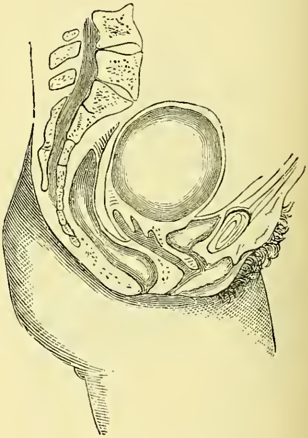

Fig. 308.
Atresia of the Cervix at Os Internum (*Schroeder*).

PROGNOSIS.

If menstrual blood be accumulating, the prognosis is always grave. In atresia of the hymen the prospect of cure by operative treatment is more hopeful than in congenital atresia of the vagina. In acquired atresia of the vagina, if the obstruction be removable, the prognosis is favourable. The unfavourable cases are those in which the vagina is partially or not at all developed; the prognosis as to curability by operation depends on the thickness of the tissue between the urethra and the rectum, which determines the possibility of opening up a vagina.

When menstrual blood has accumulated, while explaining to the patient's friends the necessity of immediate operative treatment, we should inform them also of the dangers attendant on the operation—the immediate danger of rupture of a blood sac in the Fallopian tube, the more remote one of simple or septic peritonitis.

The seriousness of the complication of hæmatosalpinx is seen in Fuld's statistics:[1] of sixty-five which he has collected, more than two-thirds (forty-eight) died; while seventeen were saved by operation.

TREATMENT.

The treatment consists in the formation of a channel to allow the menstrual blood to escape; in the case of imperforate hymen this is easily done by incising the membrane, but in atresia vaginæ we have to construct a new vaginal canal. Two dangers associated with this operation must be kept in view. *First*, too rapid collapse of the sac may lead to rupture of the Fallopian tubes or of vascular adhesions round the uterus. This rupture may be brought about in the following way, as has been shown by post-mortem examination. The Fallopian tube has been previously bound down to the side wall of the pelvis by adhesions; when the sac is opened into, the uterus necessarily follows its retreating wall and, if this retreat takes place rapidly, the tube is exposed suddenly to a strain which ruptures it; death results from hæmorrhage or peritonitis. To prevent this accident, the operator should allow the contents of the sac to escape slowly and should on no account apply pressure from above to hasten the process. *Second*, the operation is frequently followed by septicæmia. To prevent this, antiseptics should be used. Listerism cannot be carried out here; but by washing out the sac carefully with carbolised water, preventing the entrance of air, and allowing free drainage when fluid collects, we greatly diminish this risk. The danger of rupture of hæmatosalpinx has only recently been recognised. Puncturing of the dilated tube is now abandoned for abdominal section; and salpingotomy (Tait's operation) should be performed in addition to the evacuation of the distended vagina when a dilated tube is present.[2]

Dangers of Operation.

Another danger, which follows some time after the operation, is the contraction of the new canal which, unless specially guarded against, may lead to its obliteration. Emmet expresses this well when he says "the surface of the canal is essentially a cicatricial one, and will consequently contract to a greater or less extent." To diminish the liability to contraction, he recommends that the tissues be torn with the finger nail or broken up with the scissors rather than divided with the knife;

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[1] *Op. cit.* These cases were collected from all sources, and before the operation for hæmatosalpinx was a recognised one.

[2] Kehrer has done this once successfully, and Leopold five times—Fuld and Leopold *op. cit.* The diagnosis of hæmatosalpinx may be made, according to Fuld, either by feeling the dilated tube or finding that the amount of fluid evacuated from the vagina does not correspond to the size of the mass felt before on palpation—the latter suggesting rupture into the abdomen. Laparotomy is called for in both cases.

the raw surface is made to heal upon a glass plug.[1] Credé [2] prevented cicatrisation by taking a flap from the labium majus and turning it into the vagina so that it could be stitched to the cervix and to the raw surface produced by dividing the old cicatricial tissue in the vagina.

We shall describe shortly the operations for (1) imperforate hymen, (2) atresia of the vagina, (3) atresia of the cervix.

Operation for Imperforate Hymen.

1. *Imperforate Hymen.* This operation, though apparently simple, should never be performed in the consulting room but always at the patient's house or in hospital. The time chosen should be between two menstrual periods which are indicated by menstrual molimina. The hymen is punctured with a small trocar which has been rendered thoroughly clean and aseptic beforehand. The fluid is allowed to escape slowly. After it has ceased to flow, the opening in the hymen is enlarged with a knife. This incision is made in the form of a cross, or the membrane is pinched up with forceps and an elliptical portion cut out. A. R. Simpson recommends that the opening in the hymen be made with the cautery, which prevents septic absorption by the wound. We can dispense with the trocar if we take care to make at first only a small opening, which can afterwards be enlarged. A stream of warm antiseptic water is now made to flow gently into the cavity; the opening should be large enough to permit the fluid to flow outwards at the same time, so that the sac may be washed out without being subjected to any pressure. A plug of lint soaked in antiseptic oil is placed in the hymeneal orifice, and a larger pad over the vulva. The patient keeps her bed for ten days after the operation. If there be a rise of temperature or other indication of septic inflammation, the vagina should be again washed out.

Operation for Atresia Vaginæ.

2. *Atresia of the Vagina.* The patient is placed in the lithotomy posture, and the labia are retracted by the fingers of the assistants who hold the thighs. The sound is passed into the previously emptied bladder; it is then held by an assistant in such a way that the urethra and bladder are drawn well upwards towards the pubes. The index finger (with, if necessary, the second) of the left hand is introduced into the rectum; and the thickness of tissue between the finger and the sound, as well as the position of the distended sac above, carefully ascertained: the finger is kept in the rectum during the operation, both to hook that structure backwards so as to prevent its being cut into and to guide in tearing up the septum. Should the operator wish to have both his hands free to use instruments, an assistant can pass the finger into the rectum. The operator now makes with a knife a transverse incision over the hymen, or through the skin between the anus and the urethra. When the sac

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[1] In the *Americ. Journ. Obst.* (1887, p. 1189) he refers to his attending in her second confinement a patient on whom he had operated ten years previously to make an artificial vagina when she was fifteen years old.

[2] *Archiv f. Gyn.*, Bd. XXII., S. 229.

is reached, it is punctured and washed out with the same precautions as in the operation for imperforate hymen; it is then carefully and gently packed with strips of lint soaked in antiseptic oil. These are taken out on the following day, but a tightly fitting plug is left in the newly formed portion of the vagina to prevent its contraction; after three or four days, a perforated glass plug (fig. 309) is passed in to keep the new canal dilated. The plugs are made of various thicknesses, and have a rim at the external end to prevent their being pushed in too far. The plug must not be so long as to press on the roof of the vagina, and should be of such a thickness that, while it can be easily slipped out and in by the wearer, it stretches the new canal; it is kept in position by tapes which are fastened to the rim and, before and behind, to an abdominal band. A pessary can be employed subsequently; some instrument may have to be worn constantly for a year or more and where there is continued tendency to contraction, for a short period daily during many years.

In a case operated on by Page, there was an accumulation of fluid in the vagina, and a second in the uterus itself which did not discharge till the cervix was incised.[1]

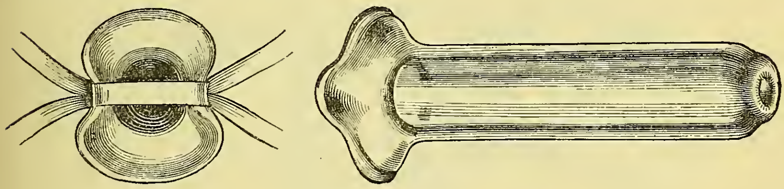

Fig. 309.

Perforated Glass Plug to be used after Operation for Atresia Vaginæ. The left hand figure shows the external end of the tube with the tapes attached.

This operation has been performed even when there has been no accumulation of menstrual blood. The indications for operating are thus given by Thomas: "It should be resorted to (*a*) if menstrual blood be imprisoned; (*b*) if a uterus can be distinctly discovered and the patient be suffering from absence of menstruation; (*c*) if the necessity for sexual intercourse be imperative." Cases have been recorded in which the formation of a vaginal canal has led to the establishment of menstruation when it was formerly absent, to the development of the uterus and ovaries where these were rudimentary (?), or to an improvement in the general health of the patient although there was no indication of further development in the rudimentary uterus and ovaries.

More difficulty is experienced in operating where there is no accumulation of menstrual blood and the vagina is entirely absent or represented by a fibrous cord. In such a case, there is not the same necessity for surgical interference unless it be to satisfy the claims of married life. If the uterus and ovaries be well developed and the patient be anxious to have her condition remedied, the operation is justifiable. Here we have not the distended sac as a guide to the point on which we are to cut down. The cervix, of which the position should be ascertained by a combined recto-abdominal examination, should be fixed as far as possible by an assistant's making firm pressure from above upon the uterus; there is no danger in such pressure if there be no accumulation of menstrual blood. The mode of procedure is the same as that just described.

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[1] *Lancet* 1884, I., p. 706.

Operation for Atresia Cervicis.

3. *Atresia of the cervix.* Usually the obstruction is so slight that the forcible passage of the sound overcomes it. Should the obstruction resist all efforts to pass the sound we require to use the knife to open the canal. If the uterus be much distended with menstrual blood, it is safer to empty it first with the aspirator-needle passed through one of the fornices; the emptying should be effected slowly and, if the distension be considerable, at more than one sitting; rapid emptying is apt to set up uterine contractions which may produce rupture of a dilated Fallopian tube. To open up the cervical canal, the following method is adopted by Thomas. The cervix is steadied with a tenaculum. A long exploring needle is passed along the line of the cervical canal into the uterine cavity, the sense of resistance overcome and the escape of a drop of blood indicating that the needle has reached it. A delicate tenotome is placed in the gutter of the needle and pushed upwards for the required distance. This process is repeated so as to divide the cervix on four sides in a radiate manner. The cavity of the uterus is washed out with a syringe, and a glass tube passed into the cervical canal to keep it open.

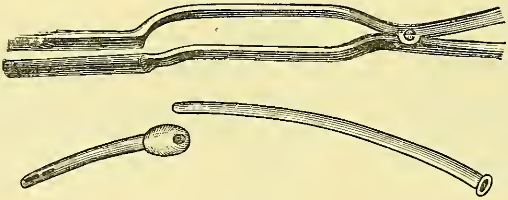

Fig. 310.

Breisky's Forceps, Tube and Nozzle, for operating in Atresia of the Cervix (*Breisky*).

Breisky has devised the instruments represented in fig. 310, to facilitate the washing out of the uterine sac in cases of extensive atresia of the vaginal canal and cervix with hæmatometra. The septum which separates the urethra and bladder from the rectum is split up so as to form a new vagina, and the cervix is thus exposed. To form the new cervical canal, Breisky employs a knife-edged trocar running in a canula. The canula is pressed firmly against the cervix, and the knife is run out piercing through the cervix into the dilated uterus above; the canula is then run on the knife into the cavity, and the knife withdrawn. The contents of the sac escape through the canula. The forceps represented at fig. 310 are now passed in with one blade on each side of the canula. They are forcibly opened so as to distend the new canal still further, and serve to keep it patulous while the canula is withdrawn and the tube represented at fig. 310 inserted in its place. This tube has two channels; into one of these a nozzle (fig. 310) fits and is employed to pass the stream of water into the sac, while the outflow takes place by the other.

Atresia of one half of a Septate Uterus and Vagina.

This form of atresia has certain characteristics which distinguish it from the other forms described above.

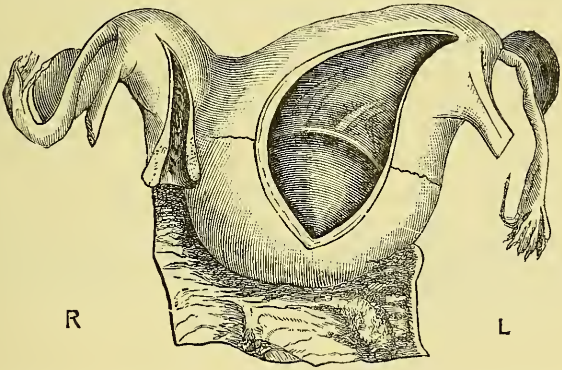

FIG. 311.

SEPTATE UTERUS; the right half is pervious, the left half has been distended with retained menstrual blood (*Schroeder*).

The chief peculiarity is that it presents the phenomena of free menstruation + those of retained menstruation.

The pathological condition is apparent from fig. 311. Spontaneous rupture of the septum with escape of the retained fluid (in this case through the patulous uterus or vagina) occurs more frequently in this than in other forms of atresia; rupture of the Fallopian tube, with its fatal consequences, is also a more frequent occurrence (*Puech*). The spontaneous rupture of the septum does not usually occur at its lowest point; hence there is liability to accumulation of purulent matter in the pouch below the point of perforation, which is a source of septicæmia.

The symptoms are the same as in the other forms of atresia, but they are masked by the presence of a menstrual flow. This visible menstruation is often irregular, and profuse leucorrhœa (from the patulous cavity) is frequently present.

Physical examination shows a fluctuating tumour lying beside the uterus and alongside of the patulous vaginal canal. Sometimes it winds in a spiral manner round the latter.

The diagnosis is not difficult if the blind sac extend to the ostium vaginæ and be felt running alongside of the vaginal canal or winding round it. If, however, it be limited to the side of the uterus or only extend partially on to the vagina, it may easily be mistaken for other para-uterine tumours—most frequently for hæmatocele. To clear up the diagnosis and also as a step towards treatment, we puncture the sac with the aspiratory-needle.[1] The character of the discharged blood will indicate the diagnosis.

The treatment consists in slowly but thoroughly evacuating the sac, washing out and establishing a permanent opening from it.

A *septate vagina* is sometimes found with a septate uterus (*v.* fig. 149), both halves being pervious so that there are no symptoms.[2] In rare cases, the one vagina is imperforate. Kleinwächter[3] records an interesting case of a bulging tumour of the anterior vaginal wall resembling in position a cystocele; it ruptured and pus escaped. On laying open the fistulous tract, its walls had the naked eye and microscopic characters of vaginal mucous membrane in a state of inflammation. Traces of a septate condition may persist as bands.

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[1] Kiderlen mentions a case from Martin's Clinic in which about 2½ pints of fluid were evacuated from the dilated right half of the vagina and uterus: *Zeits. f. Geb. u. Gyn.*, B. XV., S. 1.

[2] Cullingworth has recorded recently two cases of a transverse septum in the lower part of the vagina: *Lancet*, 1889, I., p. 726.

[3] *Zeits. f. Geb. u. Gyn.*, B. XI., S. 254.

CHAPTER XLVI.

VAGINITIS: VAGINISMUS: TUMOURS.

LITERATURE OF VAGINITIS.

Barnes—Diseases of Women, p. 865: London, 1878. *Hennig*—Der Katarrh der weiblichen Geschlechtsorgane. *Hildebrandt*—Monat. f. Geb., Bd. XXXII., S. 128. *Macdonald, Angus*—Edin. Med. Journ., June 1873. *Miller, A. G.*—Four and a Half Years' Experience in the Lock Hospital, Edinburgh: Edin. Med. Journ., 1883. *Nœggerath*—Latent Gonorrhœa in the Female Sex: Am. Gyn. Trans., Vol. I., p. 268. *Ruge*—Ueber die Anatomie der Scheidenentzündung: Zeitschrift, f. Geb. u. Gyn., Bd. IV., S. 133. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 460: Leipzig, 1879. *Thomas*—Diseases of Women, p. 211: London, 1882. *Winckel*—Colpohyperplasia cystica, etc.: Arch. f. Gyn., Bd. II., S. 406. See also Index of Recent Gynecological Literature in Appendix.

VAGINITIS.

SYNONYMS.—Colpitis (Gr. *κόλπος, a fold*): Elythritis (Gr. *ἔλυτρον*, a sheath).

NATURE AND VARIETIES.

Vaginitis is an inflammation of the mucous membrane of the vagina. The structure of this mucous membrane has been already described (*v.* p. 27). From its consisting of connective-tissue papillæ covered with several layers of squamous epithelium, it resembles the structure of the skin rather than that of a mucous membrane; exceedingly few mucous glands are present. Consequently, the inflammatory changes are more allied to those of the skin than to those of a mucous membrane (*Schroeder*).

According to etiology, vaginitis is either *simple* or *gonorrhœal.* Apart from the history, we cannot for certain distinguish between these (*v.* Etiology).

The clinical distinction between *acute* and *chronic* vaginitis is merely a question of degree.

Diphtheritic vaginitis will be referred to by itself.

Senile vaginitis is one of the physiological retrogressive processes occurring after the menopause.

PATHOLOGY.

Simple Vaginitis.

Vaginitis occurs most frequently in the form of slight elevations of the mucous membrane, which produce a granular surface. These granulations, according to Ruge, consist of groups of papillæ infiltrated with small cells; these swell up and push before them the stratified squamous epithelium, the superficial layers of which are shed (fig. 312). When the condition has existed some time, the surface becomes more equal through the thinning of the epithelial covering (fig. 313).

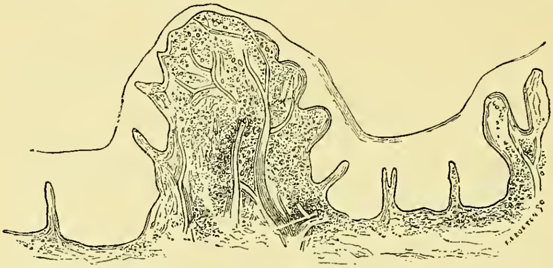

FIG. 312.
GRANULAR VAGINITIS—acute form (*Schroeder*).

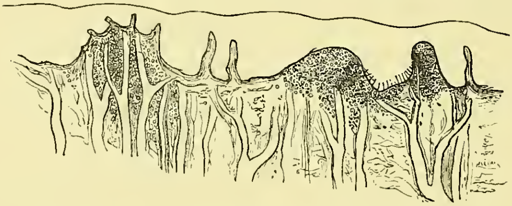

FIG. 313.
GRANULAR VAGINITIS—chronic form (*Schroeder*).

Emphysematous Vaginitis.

Associated with vaginitis in pregnancy, there is sometimes an emphysematous condition of the vaginal mucous membrane. Winckel has described cysts containing gas and fluid; according to Ruge, the air is present in spaces among the cellular tissue (fig. 314), while Zweifel

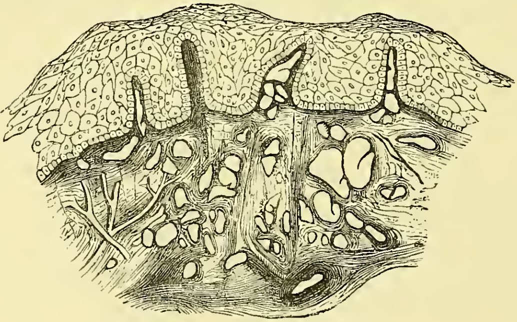

FIG. 314.
COLPITIS EMPHYSEMATOSA (*Schroeder*).

thinks they arise from vaginal glands the ducts of which have been closed by inflammation. This form of inflammation cannot be separated from vaginal cysts, to be noticed on p. 533.

Gonorrhœal Vaginitis.

In gonorrhœal vaginitis, a gonococcus is present which was first described by Neisser; the individual is like a coffee-bean in shape, and they are aggregated in round clusters. Bumm[1] finds its presence to be diagnostic, and notes this interesting fact, that the seat of its propagation is the urethral and cervical mucous membrane; it cannot burrow through the many-layered squamous epithelium of the vagina.

The cicatricial contraction of the vagina observed after the menopause is due to a senile vaginitis. The epithelium is shed in patches, and the raw surfaces thus produced adhere together (*Hildebrandt*). This process is similar to that which produces occlusion of the cervical canal after the menopause.

Diphtheritic Vaginitis.

Diphtheritic vaginitis occurs either as localised patches or as an affection of the whole vagina. In the latter case, the mucous membrane may be so swollen that the finger scarcely reaches the cervix, which also is found to be thickened and covered with the diphtheritic membrane.

ETIOLOGY.

The following are the most important causes :—

Gonorrhœal infection ;
Irritating discharges from the uterus ;
Injurious vaginal injections, badly fitting pessaries, or other causes which injure the vaginal mucous membrane ;
Exanthemata.

Gonorrhœa.

Gonorrhœal infection produces the most intractable form of vaginitis, which may extend over months or years. The poison may spread along the mucous membrane of the uterus and Fallopian tubes causing endometritis (p. 321), pyosalpinx (p. 197), and pelvic peritonitis (p. 158).

Endometritis.

Irritating discharges from the uterus, as in endometritis, produce a secondary vaginitis which can only be treated by curing the uterine affection. In carcinoma and vesico-vaginal fistulæ, vaginitis arises secondarily.

Mechanical Irritants.

Among the causes which irritate or injure the vaginal mucous membrane, we mention injections of too hot or too cold water and of substances to produce abortion, badly-fitting pessaries, tampons or pieces of sponge which have been allowed to lie some days in the vagina. Vaginitis may also develop on a patient's entering married life, simply from awkwardness in sexual intercourse; on being consulted about such cases, we must remember that *a simple vaginitis may produce most of the symptoms of one due to gonorrhœa.*

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[1] Beitrag zur Kenntniss der Gonorrhoe der weiblichen Genitalien : *Archiv f. Gyn.*, B. XXIII., S. 327.

Exanthemata as a cause.

Diphtheritic inflammation occurs usually in the puerperal condition and that through bad hygiene. It has been observed in *typhus*, *small-pox*, and *cholera*, and also in some cases of gonorrhœa. Localised diphtheritic patches are seen in fistulæ, in carcinoma, and round badly-fitting pessaries.

SYMPTOMS.

These are the following :—

A burning heat in the vagina ;
Pain in the floor of the pelvis ;
Frequent desire for micturition, with a scalding sensation while water is passing ;
Free muco-purulent leucorrhœa.

These symptoms are present both in simple vaginitis and that due to gonorrhœal discharge. In the latter case, the urinary symptoms are more pronounced ; there is a distinct period from which all the symptoms commenced, their duration is longer, and they resist treatment ; they are often complicated with those of enlarged inguinal glands, endometritis, cystitis, or pelvic peritonitis.

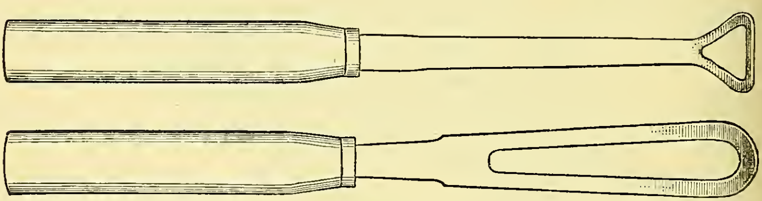

Fig. 315.
Henderson's Vaginal Spatulæ (*A. G. Miller*).

DIAGNOSIS.

On vaginal examination, the finger recognises the discharge which escapes on separating the labia, and, in many cases, the rough condition of the mucous membrane.

The speculum shows that the mucous membrane is inflamed and covered with muco-purulent discharge ; the redness is usually in the form of patches but may be diffuse.

The appearance of the cervix must be noted to ascertain that the leucorrhœal discharge does not come from it ; the differentiation of discharge from the uterus and that from the vagina, is made as described on page 309.

Fig. 315 shows two spatulæ used by Henderson of Shanghai in examining gonorrhœal and specific cases. They are exceedingly useful in separating the labia; one blade can be employed as a Sims speculum, and pressure can be made along the anterior vaginal wall over the course of the urethra to ascertain if there is any urethritis.

The *differential diagnosis* between *simple and gonorrhœal* vaginitis is often very difficult. The history of a distinct source of infection is the only certain guide, and the ascertaining of this is a very delicate question. Apart from this, the following conditions point to a gonorrhœal origin: sudden development of vaginitis with urinary symptoms, in a patient who has had previously no marked leucorrhœal discharge; absence of any other cause to explain these; protracted duration of symptoms and resistance to treatment. However convinced the practitioner may be in his own mind that the vaginitis is of a specific nature, the social unhappiness caused by his expressing a decided opinion should deter him from giving it in cases where a cause is not admitted.

Pelvic abscesses discharging through the roof of the vagina have been mistaken for vaginitis (*Thomas*). Such a mistake will not arise when the Bimanual and other methods of examination are employed. We must not be satisfied with finding vaginitis; the whole routine examination of the pelvic organs must be made after the pressing symptoms have been relieved.

TREATMENT.

In *acute cases*, rest in bed is necessary. Hot water injections are given three or four times daily: the douche is much more convenient than the syringe; it leaves the hands free, requires less exposure of the patient, and keeps up a steady stream (*v.* p. 138). The stream should run for a quarter of an hour. A piece of gutta-percha tubing, weighted at one end and with a clip at the other, makes a handy douche; the weighted end is placed in a ewer of water above the level of the bed, the tube is coiled up in the water so as to be filled, the clamp is put on at the other end and the tube withdrawn; the syphon-action is started by the column of water in the tube and continues till the ewer is empty. The bowels are freely moved, and then a morphina suppository is given. Complete rest from sexual activity is absolutely necessary.

In chronic cases or after the acute stage has passed off, astringents are added to the injections. The vaginal walls having been first thoroughly dried, a solution of nitrate of silver (ʒj to ℥j of water) is applied and a tampon of antiseptic cotton soaked in glycerine and bismuth introduced to keep the walls apart. Chloride of zinc (2 grs. to ℥j) is recommended by Fritsch.

Medicated Pessaries.

Applications to the vagina are usually made by means of medicated pessaries. The following are those most frequently used[1] :—

Atropine	Sedative	1-20	grain.
Belladonna	do.	2	do. Alo. Ext.
Morphina	do.	½	do.
Bismuth Oxide	Cicatrising & Emollient	15	do.
Borax	do. do.	15	do.
Zinc Oxide	do. do.	15	do.
Tannin	Astringent	10	do.
Alum	do.	15	do.
Acetate of Lead and Opium	do.	5	do. 2 grs. Opium
Gallic Acid	do.	10	do.
Persulphate of Iron	Hæmostatic	5	do.
Sulphate of Zinc (dried)	Caustic	10	do.
Iodide of Lead	Alterative & Resolvent	5	do.
Mercurial	do. do.	30	do. (*Ung. Hydrarg.*)
Carbolic Acid.	Deodorant	5	do.

Tampons.

Lawton's absorbent cotton[2] is the best material for vaginal tampons which are to be soaked in glycerine or other medicaments.

VAGINISMUS.

LITERATURE. *Duncan, Matthews*—Diseases of Women, p. 142: Lond. 1883. *Henrichsen*—Strictur des Scheidengewölbes, bewirkt durch Krampf des Musculus levator ani: Archiv f. Gyn., Bd. XXIII., S. 59. *Hildebrandt*—Ueber Krampf des Levator ani beim Coitus; Archiv f. Gyn., Bd. III., S. 221. *Scanzoni*—Lehrbuch der Krankheiten der weiblichen Geschlechtsorgane, S. 704: Wien, 1875. *Simpson, Sir J. Y.*—Edin. Med. Journ., Dec. 1861. And Diseases of Women, p. 284: Edin., 1872. *Sims*—Cases of Vaginismus: Americ. Med. Times, 1862, Nos. 22 to 25. *Thomas*—Diseases of Women, p. 203: Lond. 1882. *Tilt*—The Lancet, Aug. 1874.

Nature.

By vaginismus, we understand a painful reflex contraction of the muscular fibres surrounding the vaginal orifice—just as laryngismus is applied to the same condition in the larynx. Marion Sims first drew attention to this condition.

ETIOLOGY.

It is found in some patients of a nervous and sensitive temperament without there being any local source of irritation, but this is exceptional.

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[1] As made up and supplied by Messrs Duncan, Flockhart & Co.

[2] Sold in packets (2 oz—½ lb.).

Usually one of the following conditions is present :—

- An irritable spot in the fossa navicularis ;
- An inflamed hymen which has not been ruptured, or irritable carunculæ myrtiformes ;
- Fissures in the fourchette or round the vaginal orifice ;
- Small ulcers within the hymen ;
- Fissure of the anus ;
- Urethral caruncle.

SYMPTOMS AND DIAGNOSIS.

Dyspareunia and sterility are the leading symptoms.

Dyspareunia.

By *dyspareunia* (a term introduced by Barnes), we understand painful or difficult sexual intercourse ; hence the conditions which produce vaginismus arise on the patient's entering married life. The suffering may be so great that medical advice is at once sought ; often a sense of delicacy prevents this till the condition has existed some time.

In some cases there is a care-worn and anxious expression of countenance, in others a hysterical manner. As the ordinary vaginal examination is painful—the patient involuntarily drawing away as soon as the painful spot is touched—it is best to make inspection of the genitals first. Here we may see any of the conditions mentioned under Pathology. Sometimes no local cause is evident ; but on carrying the finger into the vagina the reflex contraction of the muscle is felt.

Hildebrandt has shown that this muscular contraction is sometimes noticed in the upper part of the vagina, and is then due to spasm of the levator ani. Henrichsen found well-marked contraction of the levator ani in one case ; he refers it to the anterior portion of the muscle which springs from the pubes and passes to the vagina near the vulva.

The possibility that the dyspareunia may be due to some local pathological condition at the roof of the vagina (prolapsed ovary or cellulitis) and not at the ostium, should be kept in mind.

The *prognosis* as to cure is good. From the distressing nature of the symptoms, and the relief obtained by the means to be described, they prove very satisfactory cases for treatment.

TREATMENT.

First remove any cause of local irritation, as urethral caruncle or irritable carunculæ myrtiformes ; in some cases it is necessary to clip away carefully the whole hymen. Divide the base of irritable fissures of the anus with the knife, or touch them with the actual cautery. Iodoform in powder or made into an ointment, is the best local application to allay irritation or favour healing. Its penetrating and disagreeable odour makes many patients object to it. This is diminished by keeping Tonquin beans in the powder, and by adding oil of eucalyptus or citronelle (10 m. to ℥i) to the ointment or pessary.

℞ Iodoform.	gr. x.
Olei eucalypti	M. i.
Fiat pessarium.	Mitte tales xii.
Sig. As directed.	

Cocaine, 5-20 p.c. solution or ointment, is also useful.

After the cause has been removed, the ostium vaginæ must be dilated. This is best effected by making the patient wear a vaginal dilator night and morning, for an hour at a time; it may be made of wood or of glass, and should have a bulbous end about $1\frac{1}{2}$ in. long. The conical form is not good. The pain caused by the introduction passes off after a time. Dilators of gradually increasing size should be used.

If the dilator cannot be worn, we must have recourse to Sims' operation. In some cases, when the vaginismus is evidently due to the narrowness of the ostium and specially when a reflex contraction of the muscle is noted, this operation is done without previous use of the dilators.

Sims' operation.

Sims' operation for vaginismus. We have already seen (p. 10) that the bulbo-cavernosi muscles embrace the ostium vaginæ and form a kind of sphincter for it; their position is seen in fig. 7. To divide the superficial fibres of this muscle is the aim of the operation.

The patient being under chloroform, two fingers of the left hand are passed into the vagina so as to stretch the ostium. With an ordinary scalpel, an incision is made on each side of the fourchette; the incision is about 2 inches long, and extends from $\frac{1}{2}$ an inch above the ostium to the raphe of the perineum. The ostium is now thoroughly and firmly plugged with lint which is kept in place with a T-bandage; thorough plugging is essential as there is often smart hæmorrhage from the incisions. Next day the lint is removed and a glass dilator introduced, which must be worn for one or two hours night and morning during a period of several weeks.

Instead of dividing the sphincter with the knife, it may be forcibly stretched with the fingers till the muscular fibre is ruptured. This is done by passing the thumbs (*Tilt*) or several fingers (*Hegar*) of each hand into the ostium, and then forcibly separating them till we feel the muscular fibre yield under the traction. The advantage of this method is that it is bloodless and there is no granulating wound left to heal.

With these local measures, we should always combine constitutional treatment. Exercise, fresh air and change of scene are beneficial. It is self-evident that complete rest to the sexual system must be strictly enjoined during any course of local treatment; this should be maintained for some time afterwards, which may be secured by recommending a few weeks' residence from home. Tonics (such as quinine, iron, and arsenic) are given as the case requires.

TUMOURS OF THE VAGINA.

Under tumours of the vagina we briefly describe the following :—

Cysts,
Fibroid tumours,
Carcinoma,
Sarcoma,
Tuberculosis.

Syphilitic ulceration does not call for special description. Lipoma has also been described.[1]

CYSTS OF THE VAGINA.

LITERATURE. *Breisky*—Die Krankheiten der Vagina, S. 130 : Stuttgart, 1879. *De Sinéty*—Manuel pratique de Gynécologie, p. 164 : Paris, 1879. *Fischel*—Casuistischer Beitrag zur Lehre von den Scheidencysten : Archiv f. Gyn., XXXIII., S. 121. *Gräfe*—Zehn Fälle von Vaginalcysten : Zts. f. Geb. u. Gyn., Bd. VIII., S. 460. *Johnston*—A Contribution to the Study of Cysts of the Vagina : Americ. Jour. of Obstet., 1887, pp. 1121, 1241. *Lebedeff*—Beitrag zur Lehre über Vaginalcysten : Zts. f. Geb. u. Gyn., Bd. VIII., S. 324. *Mundé*—Case of Cyst of the Vagina : Americ. Jour. of Obstet., vol. X., p. 673. *Veit*—Ueber einen Fall von sehr grosser Scheidencysten : Zts. f. Geb. u. Gyn., Bd. VIII., S. 471. *Von Preuschen*—Ueber Cystenbildung in der Vagina : Virchow's Archiv, Bd. LXX., S. 3. Johnston's paper discusses fully the literature of the subject. See also Index of Literature in Appendix.

Pathology. They are situated most frequently in the anterior vaginal wall, and usually in the lower third but within the ostium. They are generally single, rarely have two or more been found together. They are lined with a single layer of cylindrical epithelium which contrasts with the many layers of squamous epithelium of the vaginal mucous membrane from which they lie separate (fig. 316). We have seen them of the size of a hen's egg. Their contents vary from a clear thin fluid to a gelatinous chocolate-coloured inspissated mucus. Fischel and others have also found cysts lined with an endothelium, and the former has demonstrated their connection with the lymphatics ; these cysts, which must be regarded as dilated lymphatics, are much rarer than those lined with cylindrical or pavement epithelium. Chéron[2] found a calculus in a cyst of the anterior wall, which communicated with the urethra ; he refers to observations by Priestley, Simon and others, of vaginal cysts associated with urethrocele, and would account for this condition by the coalescence of a cyst with the urethra.

Etiology. As there are hardly any mucous glands present in the vaginal mucous membrane, the mode of origin of these cysts is disputed. In some cases they can be traced to crypt-like depressions of the mucous membrane which become shut off (*Von Preuschen*). It has been suggested by Veit that they are due to persistence of the canals of Gärtner, rudimentary structures which run alongside of the uterus and vagina (cf. Pl. XI., and p. 227). They may also be developed from one duct of Müller, a condition similar to *Septate Vagina* (*v.* p. 523); they have then the same structure as the vagina. A case of suppurating hydatid of the vagina has been recorded by Porak.[1] Thorn [2] accounts for some cysts by traumatic blood and lymph extravasations.

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[1] Conrad—*Cent. f. Gyn.*, XII., S. 214.

[2] *Archives de Toc.*, 1887, p. 539.

Symptoms. These are often nil; and such cysts readily escape observation, so that they may be more frequent than is supposed. When of large size, they produce bearing down pain with leucorrhœa and in some cases dyspareunia.

Diagnosis. Small cysts readily escape detection. When large, their smooth elastic surface and fluctuation make them easily recognised. They must not be confounded with cysts due to obstructed Bartholinian glands, which are situated on the labia minora or at the ostium. Careful examination will easily distinguish them from a pouching of the bladder or rectum.

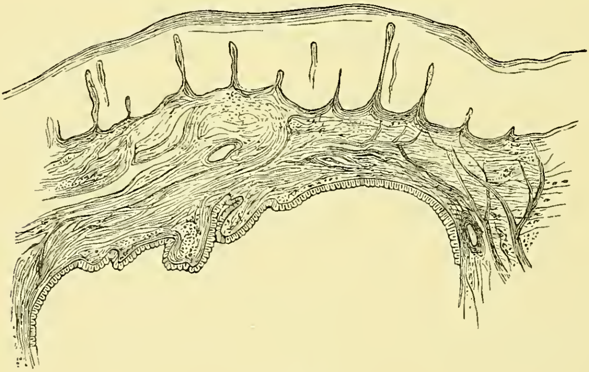

Fig. 316.

Section of Vaginal Cyst (*Schroeder*). The cyst wall which is lined with a single layer of epithelium is separated by some tissue from the mucous membrane which is covered with many layers of squamous epithelium not detailed in the section.

Treatment. This consists in laying the cyst open and destroying its lining wall, which is best done by the cautery. Schroeder cuts out a portion of the cyst wall, and stitches the margins of the rest to the adjoining vaginal mucous membrane so that the cyst is taken up into the vagina; this does away with the granulating surface and subsequent

[1] *Archiv. de Tocolog.*, 1884, p. 163.

[2] *Centralb. f. Gyn.*, 1889, S. 658.

cicatrisation which accompany cauterisation. If the patient is past the menopause and the cyst gives no trouble, there is no occasion to interfere.

FIBROID TUMOURS OF THE VAGINA.

LITERATURE. *Breisky*—Die Krankheiten der Vagina: Stuttgart, 1879, S. 139. *A. R. Simpson*—Fibroma Vaginæ, Contributions to Obstetrics and Gynecology, p. 201: Edinburgh, 1880.

Pathology. Fibroid tumours rarely originate in the vagina; Breisky has collected only 37 cases out of the literature. Michie[1] has recently recorded a case but gives no microscopic examination of the tumour. Like fibroid tumours of the uterus, they consist chiefly of fibrous tissue with some unstriped muscular fibre; they are usually situated in the anterior wall, in 17 out of 27 cases (*A. R. Simpson*); they are pediculated (forming so-called fibrous polypi) or sessile.

Symptoms. These are produced only when the tumour is large. In the case described by A. R. Simpson, in which the tumour was the size of two fists, it interfered with micturition and the escape of the uterine discharges.

Diagnosis. This is easy, except in the case of large tumours when the pedicle is difficult to reach. The relation of the bladder should always be carefully ascertained by passage of the sound.

Treatment consists in division of the capsule and enucleation of the tumour when it is sessile, or ligature and division of the pedicle when it is pediculated.

CARCINOMA OF THE VAGINA.

LITERATURE. *Breisky*—Die Krankheiten der Vagina, Billroth's Handbuch: Stuttgart, 1879, S. 151. *Bruckner*—Der primäre Scheidenkrebs und seine Behandlung: Zeitschrift für Geburtshülfe und Gynäk., B. VI., Hft. 1, S. 110. *Goodell*—Boston Gyn. Jour., vol. VI., p. 383. *Küstner*—Ueber den primären Scheidenkrebs: Archiv f. Gynäk., Bd. IX., S. 279. *Parry*—Primary Cancer of Vagina: Amer. Jour. of Obstet., vol. V., p. 163: and Philad. Med. Jour., Feb. 1873. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, p. 205: Edinburgh, 1880. See also Index of Recent Gynecological Literature in the Appendix.

Pathology. Primary carcinoma occurs very rarely in the vagina—in 14 out of 8287 cases (*Beigel*); in the paper cited above, Küstner has collected but 28 cases out of the whole literature. This is the more surprising when we remember how very frequently it affects the cervix. It occurs in two forms, either as a localised broad-based papillary swelling seated most frequently in the posterior wall or as a diffuse infiltration which often constricts the canal in a ring-like manner. The inguinal glands are generally enlarged by carcinomatous infiltration.

Symptoms and Diagnosis. As in carcinoma of the cervix, there is hæmorrhage and fœtid discharge: the pain is slight in the early stage.

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[1] *Brit. Med. Journ.*, 1884, I., 1154.

The diagnosis that there is *primary* carcinoma of the vagina is often doubtful, because it is difficult to ascertain the condition of the cervix and uterus; in the specimen represented at fig. 281 it was supposed to be primary until the post-mortem showed that it was secondary to carcinoma of the cervix. The examination per rectum is useful in these cases.

Treatment. This consists in the removal of as much as possible of the diseased tissue with the cautery, spoon, or knife. Bruckner recommends that, where possible, the wound produced by extirpation of the carcinomatous mass be closed by deeply placed sutures. Rüter [1] records a case of non-recurrence for three years after removal.

SARCOMA VAGINÆ.

LITERATURE. *Breisky*—Die Krankheiten der Vagina: Billroth's Handbuch, S. 150. *Mann*—Sarcoma of the Vagina: Amer. Jour. of Obst., vol. VIII., p. 541. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, p. 204: Edin. 1880. *Smith*—Amer. Jour. of Obst., vol. III., p. 671. *Spiegelberg*—Zu den Sarkomen des Uterus und der Scheide: Arch. f. Gyn., Bd. IV., S. 344. See also Index of Recent Gynecological Literature in the Appendix.

Sarcoma of the vagina has only recently been described, and is still rarer than sarcoma uteri. It may arise very early in life, being sometimes apparently congenital.[2] As in the uterus, it is either diffuse or in circumscribed nodules (*v.* fig. 297). The symptoms are the same as in sarcoma uteri; and the treatment consists in removal (more easily effected in the circumscribed form), which in a case reported by Spiegelberg effected a permanent cure.

A case came under our notice in which the patient died from bleeding within fifteen weeks after the tumour, the size of a walnut, first attracted attention. It was situated on the posterior wall, and the free bleeding was probably due to the venous plexuses being eaten into. The case is reported by Simmons,[3] and Plate XIII., fig. 3, taken from his paper, shows a section of the tumour. Schuckhardt [4] has recorded three cases of operation for its removal in children under eight years of age, with the result that one was still without return after two years; a second died from recurrence, while the third was operated on again for recurrence.

TUBERCULOSIS VAGINÆ.

LITERATURE. *Klob*—Patholog. Anat. d. weibl. Sexualorgane, S. 432: Wien, 1864. *Deschamps*—Études sur quelques ulcérations rares et non vénériennes de la vulve et du vagin: Archiv. de Tocolog., 1885, p. 19. *Hegar*—Die Enstehung, Diagnose, und chirurgische Behandlung der Genitaltuberculose des Weibes: Stuttgart, 1886.

It is only of importance as part of a general affection, to be treated constitutionally. Hegar divides it into primary and secondary: the

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[1] Ein Fall von Carcinom der Scheide: *Centralb. f. Gyn.*, XI., S. 606.

[2] As in a case of Graenicher's where a tumour was first noticed shortly after birth, removed at 15 months, and recurred at 4th year. *Centralb. f. Gyn.*, XIII., S. 591.

[3] Rare cases of malignant disease of the Female Sexual Organs: *Edin. Med. Journ.*, Dec. 1885.

[4] Ueber Sarkom der Scheide: *Archiv f. Gyn.*, XXXII., S. 400.

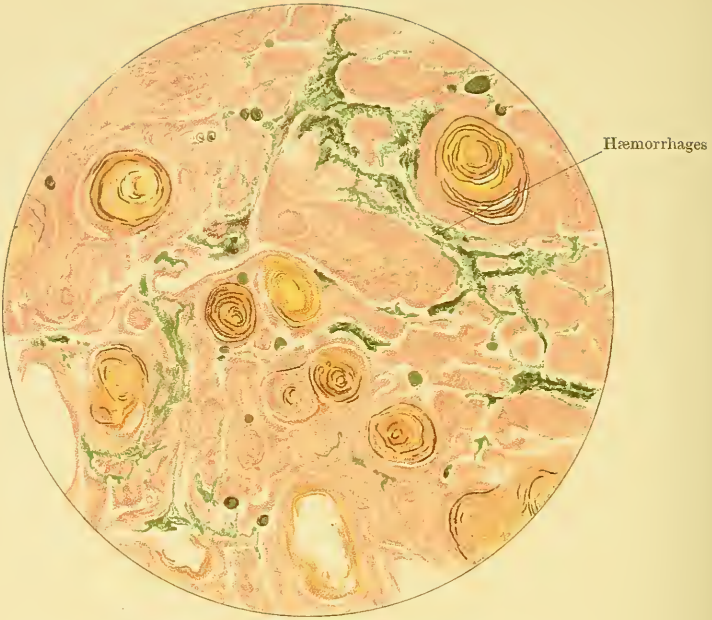
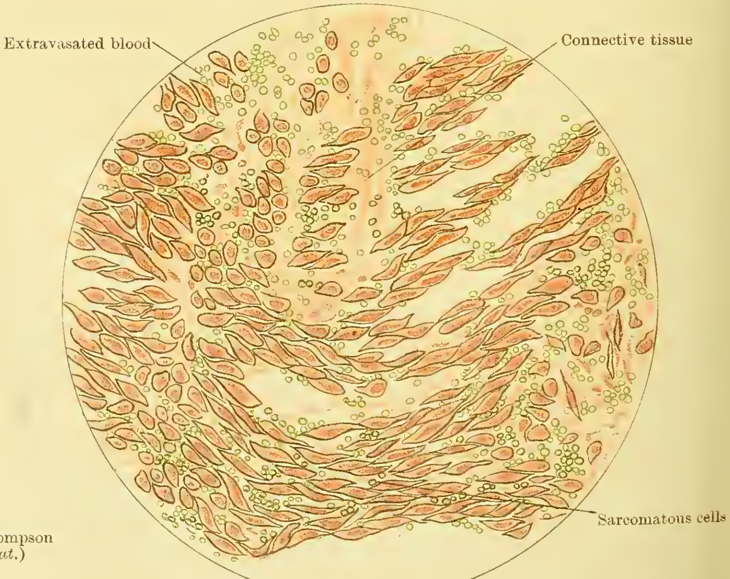


Fig. 2. Section of Epithelioma of Labia—stained picrocarmine (× 50)



J. Tatham Thompson
(*del. ad. nat.*)

Fig. 3. Section of Sarcoma of Vagina: stained picrocarmine (× 300)

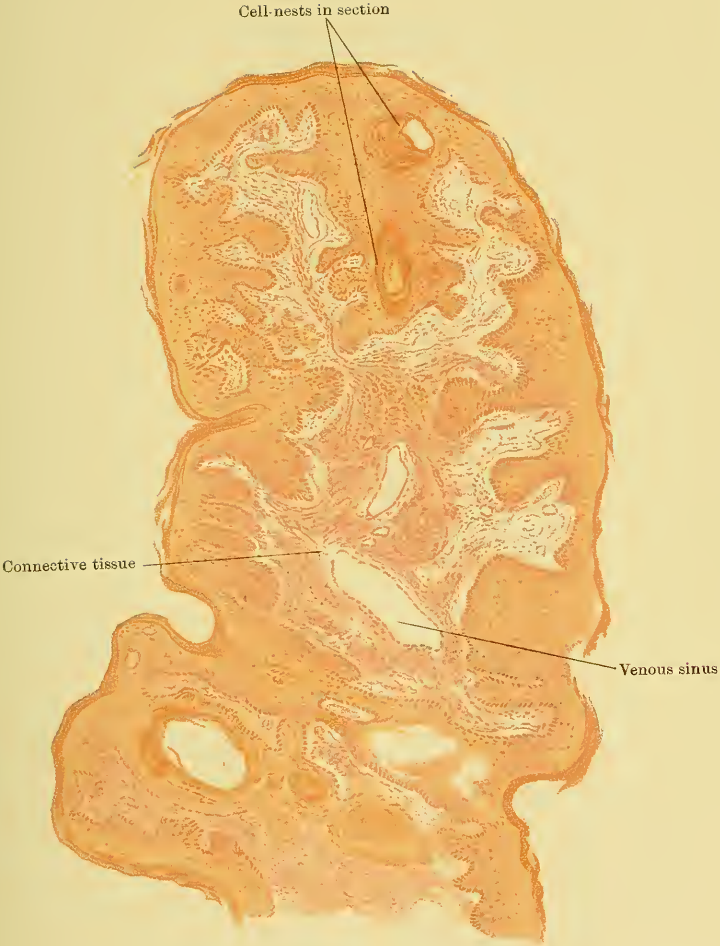


Fig. 1. Section of Epithelioma of Clitoris—stained picrocarmine (× 40)

W. & A. K. Johnston, Edinburgh & London

former is specially liable to arise after labour when the tissues are soft through direct infection from instruments, examining fingers or coitus; the latter takes place through the blood, or from the outside, *e.g.*, by germs from the stools. Barbier[1] says that the bacilli may be either in the seminal fluid itself or in the discharge from a tubercular epididymitis. Zweigbaum,[2] in reporting a case of primary tuberculosis of the cervix and vagina with secondary of the lung and intestines, has collected twenty-nine cases of tuberculosis of vagina and cervix.

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[1] *Gaz. Med.*, 1888, No. 39.

[2] *Brit. Med. Journ.*, 1889, I., p. 93.

SECTION VII.

AFFECTIONS OF THE VULVA AND PELVIC FLOOR.

Chapter XLVII. The Vulva: Malformations; Inflammation; Tumours.
,, XLVIII. Rupture of the Perineum and its Operative Treatment.
,, XLIX. Displacements of the Pelvic Floor: Prolapsus Uteri; Enterocele.

CHAPTER XLVII.

THE VULVA: MALFORMATIONS; INFLAMMATION; TUMOURS.

LITERATURE.

MALFORMATIONS. *Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien: Stuttgart, 1877, S. 2. *Meyer*—Virchow's Archiv., XI., p. 420. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 497; Leipzig, 1879. *Simpson, Sir J. Y.*—Hermaphroditism: Collected Works, vol. II., p. 407. *Tait, Lawson*—Am. Gyn. Trans., vol. I., p. 318.

INFLAMMATION. *Hildebrandt*—Op. cit., S. 17 and 64. *Simpson, Sir J. Y.*—Diseases of Women, p. 286. *Thomas*—Diseases of Women, p. 122: London, 1880.

TUMOURS. *Breisky*—Ueber Kraurosis vulvæ, eine wenig beachtete Form von Hautatrophie am Pudendum muliebre: Zeitsch. für Heilkunde, vi. 69. Also Centralb. f. Gynäk., 1885, 359. *Deschamps*—Epithélioma primitif de la vulve; Esthiomène: Archiv. de Tocologie, 1885, pp. 120, 221. *Duncan, J. Matthews*—On the Hypertrophy of Lupus of the Female Generative Organs: Lond. Obst. Tr., 1885, p. 230. See also Ed. Med. Jour., July 1884, and Clinical Lectures, 1886. *Duncan, J. M. and Thin*—On the Inflammation of Lupus of the Pudendum: London Obst. Tr., 1885, p. 310. *Hildebrandt*—Op. cit. Chap. VII., where the student will find the literature of the various forms of tumour fully given. *Huguier*—Mémoire sur l'Esthiomène: Memoires de l'academie de Médecine, t. XIV., p. 508. *Küstner*—Zur Pathologie und Therapie des Vulvacarcinoms: Zeitsch. f. Geb. u. Gyn., 1882, 70. *Lomer*—Zur Casuistik des Carcinoms der Vulva: Ztschrift. f. Geb. u. Gyn., 1882, 167. *MacDonald, Angus*—Lupus of the Vulvo-anal region, with cases: Ed. Obst. Tr., IX., 49. *Peckham*—A Contribution to the Study of Ulcer Lesions of the Vulva: Am. Journ. Obst., 1887, p. 785. *Simmons*—Rare cases of Malignant Disease of the Female Sexual Organs: Ed. Obst. Tr., X., 202. *Tait, Lawson*—Climacteric Diabetes in Women: Practitioner, June 1886. *Taylor, J. E.*—Lupus or Esthiomène of the Vulvo-anal region: Am. Gyn. Tr., VI., 199. *Zweifel*—Die Krankheiten der äusseren weiblichen Genitalien und die Dammrisse: Handbuch der Frauen-Krankheiten, Billroth and Luecke, Bd. III., Stuttgart, 1886. See also Index of Recent Gynecological Literature in the Appendix for all of these subjects.

MALFORMATIONS.

Development.

THESE are easily understood when we remember the normal development of the external organs of generation. 1. At the sixth week of fœtal life, the *genital eminence* appears externally; at this period the rectum, allantois and ducts of Müller communicate with one another but not with the exterior (fig. 317). 2. At the tenth week a depression of the skin (known as the *genital cleft*) occurs; this extends inwards till it meets the conjoined allantois and rectum, and thus the cloaca is formed (fig. 318). 3. The tissue between the rectum and the allantois grows downwards, and divides the cloaca into an anterior part (the *uro-*

genital sinus, into which the ducts of Müller open) and a posterior part (the anus): thus the *perineum* is formed (figs. 319 and 320). 4. The uro-genital sinus contracts in its upper portion to form the urethra, while the lower part persists as the vestibule (fig. 321); the ducts of Müller coalesce to form the vagina (*v.* p. 73).

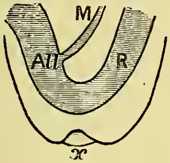

FIG. 317.
R rectum continuous with *All* allantois (bladder) and *M* duct of Müller (vagina). *x* Depression of skin below genital prominence which grows inwards and forms vulva (*Schroeder*).

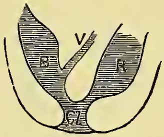

FIG. 318.
The depression has extended inwards and becoming continuous with the rectum and allantois, formed the cloaca *cl* (*Schroeder*).

The parts round the vulva develop, therefore, as follows; the *clitoris* from the genital eminence, the *labia minora* from the margins of the genital cleft, the *vestibule* from the uro-genital sinus.

Malformations.

The following malformations have been described. 1. *Complete atresia of the vulva* through the non-formation of the depression of the skin (fig. 317); the allantois and rectum either communicate as in fig. 317 or have become separated. This condition has only been found in fœtal monstrosities. 2. *Persistence of a cloaca* so that the rectum, vagina and urethra have a common orifice (fig. 318); such cases are sometimes spoken of as atresia of the anus but are really due to non-formation of the recto-vaginal septum. 3. *Persistence of the uro-genital*

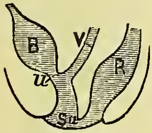

FIG. 319.
The cloaca is becoming divided into uro-genital sinus *Su* and anus by the downward growth of the perineal septum. The ducts of Müller have united into the vagina *V* (*Schroeder*).

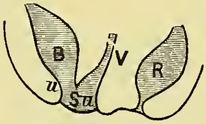

FIG. 320.
The perineum is completely formed (*Schroeder*).

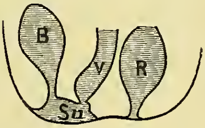

FIG. 321.
The upper part of the uro-genital sinus has contracted into the urethra; the lower portion persists as the vestibule *Su* (*Schroeder*).

sinus into which the bladder opens directly as the urethra has not formed (fig. 320); in such cases the vulvar orifice is contracted and opens into a long narrow vestibule which, at its farther end, communicates with the bladder and vagina. This condition is sometimes described as hypospadias.

HERMAPHRODITISM.

For a detailed description of this condition with illustrative cases, the student should consult Sir J. Y. Simpson's exhaustive article on Hermaphroditism (Collected Works, Vol. II., p. 407). References to recent cases will be found in the Index in the Appendix.

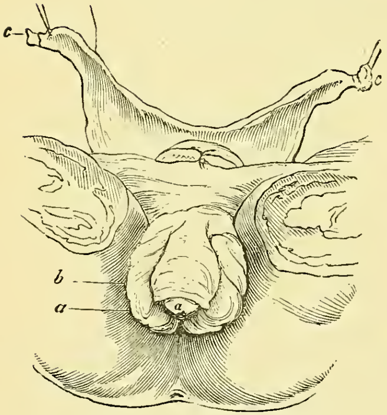

FIG. 322.

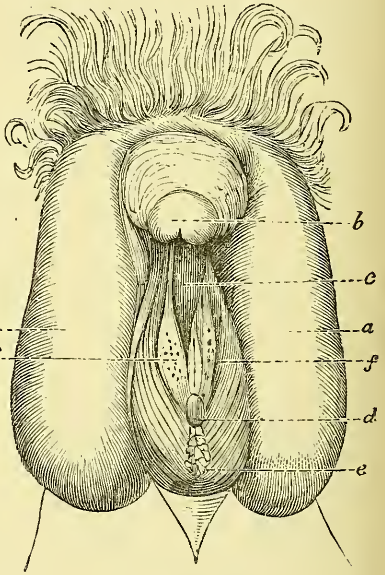

FIG. 323.

SPURIOUS HERMAPHRODITISM (*Sir J. Y. Simpson*).

Pelvis of a female infant in which the external organs simulated those of a male. *c* Uterus and appendages, *b* hypertrophied clitoris with a sulcus at its extremity *a*, which ended blindly, and did not communicate with the urethra.

Case of hypospadias in the male, making the external organs simulate those of the female. *aa* Lobes of scrotum; *b* imperforate penis, 1½ inches long; *e* perineal fissures 1½ inches deep, lined with mucous membrane, at bottom of which the urethral orifice *d* is seen; *c* the split urethra, with openings *f* of glands beside it—supposed to be orifices of prostatic ducts, of Cowper's glands, and of seminal canals.

Of hermaphroditism (Ερμῆς and 'Αφροδίτη) there are two varieties, true and spurious.

True Hermaphroditism.

By *true hermaphroditism*, we understand that from the Wolffian bodies both ovary and testicles have developed so that both forms of gland co-exist in the same individual. This is an extremely rare occurrence; when it has occurred, there is a tendency towards the better development of one form of organ (determining the sex) while the other is rudimentary. According to Hildebrandt (*loc. cit.*, S. 6), only two authentic cases of bilateral hermaphroditism (ovary and testicle present on each side) have been recorded; of unilateral hermaphroditism (ovary and testicle present on one side), the other side having only one form of gland, a case has been recorded by Bannon; lateral hermaphroditism (ovary on one side and testicle on the other) has been more frequently met with and cases, confirmed by microscopic examination, have been recorded by Berthold, Barkow, and Meyer.

False Hermaphroditism.

By *false or pseudo-hermaphroditism*, is understood a malformation of the external organs so that they simulate those of the opposite sex. This occurs in two forms. 1. The external organs in the female may simulate those of the male. This is due to a hypertrophy of the clitoris and its prepuce, with approximation of the labia majora (simulating a scrotum) and contraction or occlusion of the ostium vaginæ; in very rare cases is the clitoris perforated by the urethral canal. This condition is seen at fig. 322, which represents the pelvis and external organs of an infant christened as a boy; a post-mortem dissection showed that the sex was female.[1]

2. The external organs in the male may simulate those of the female; the non-closure of the lower surface of the urethra and perineum, which constitutes hypospadias, produces an appearance resembling the external organs in the female. Numerous cases are on record in which the sex of males has been mistaken, even by medical experts, and the persons have entered married life as belonging to the female sex. The penis may be small and imperforate, the urethra opening at its base; the perineal fissure, lined by mucous membrane, may closely resemble the vagina; and the halves of the scrotum may appear like labia. This condition is seen at fig. 323: the case is reported by Otto;[2] the person lived in a state of wedlock with three husbands before the true sex was ascertained by medical examination.

Epispadias mistaken for Hermaphroditism.

Cases of epispadias, in which the urethra (through defect of the upper portion of the penis) is exposed along with a portion of the bladder, would only on hasty examination be mistaken for the external female organs. The exposed vesical mucous membrane with its skin margins resembles the vagina with the labia, but it is situated above the pubis; further, below the penis we find the normal scrotum and testicles.

Diagnosis. In examining a case, proceed as follows. 1. Palpate the supposed labia carefully to ascertain whether testicles are present in them; the possibility of hernia of the ovaries into the labia and of non-descent of the testicle into the scrotum, must be kept in view.

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[1] Ramsbotham—*Medical Gazette*, XIII., p. 184.

[2] Sir J. Y. Simpson—*Op. cit.* p. 427.

2. Examine per rectum for traces of uterus or ovaries. 3. After puberty watch for the menstrual molimina or hæmorrhage in the female, and for development of sexual powers in the male. 4. Note secondary sexual characters: development of breasts, appearance of face, tone of voice, and inclination towards one or other sex.

Hermaphroditism, like malformations in general, lies beyond treatment.

INFLAMMATION OF THE VULVA (VULVITIS).

Varieties. We may have

Acute vulvitis,
Chronic vulvitis,
Follicular vulvitis,
Erysipelas or gangrene,
Progressive gangrene or progressive suppuration.

Abscess of Bartholinian gland.

Pathology. In the acute stage, the mucous membrane round the ostium vaginæ and urethra is red, swollen and painful. Sometimes the mucous glands are obstructed, and a form of acne develops; the Bartholinian glands may inflame and suppurate, producing an abscess about the size of a pigeon's egg; the sebaceous glands at the roots of the hair on the labia majora are sometimes specially affected, producing the "Folliculite vulvaire" of Huguier, an excessively rare affection. In the chronic stage, there is abundant secretion of creamy purulent matter; when due to gonorrhœa, papillomata form round the vaginal orifice. Erysipelas or gangrene usually occurs after labour, or in infants after fevers (J. M. Duncan). Progressive gangrene with destruction of parts may occur; and in old or young women we may get recurring boils, for which Duncan recommends rubbing with mercurial ointment.

Etiology. It is often secondary to vaginitis, and accompanies urinary fistula and carcinoma. Want of cleanliness and protracted exercise, specially in hot weather, produce it and that most readily in patients with much adipose tissue. It is sometimes occasioned by awkward coitus and by masturbation. In children, it is not uncommon; it is important to remember this, as the inflamed appearance of the vulva and the profuse discharge make the parents suspect that the child has been violated and has contracted specific disease. It is caused by irritation of urine, want of cleanliness, and the strumous diathesis; sometimes it takes an epidemic form in the children of a family or district. These last are probably due to speading of gonorrhœa[1] through want of cleanliness.

The Symptoms and Physical Signs will be apparent from what has been said under Pathology.

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[1] Pott—*Archiv f. Gyn.*, XXXII., S. 493.

Treatment. Strict attention to cleanliness must be enjoined; frequent bathing with warm water and the application of hot linseed poultices will ease pain. In children, the pain in micturition is relieved by its being done while in a warm bath. Sedative lotions such as acetate of lead and opium may be required :—

℞	Tinct. opii.	℥ss.
	Plumbi acetat.	ʒi.
	Aquam ad	℥vi. M.

In chronic cases, frequent washing with 2 per cent. sol. of carbolic or with astringent lotion is necessary. In abscess of the glands, the pus is evacuated through the gland ducts on pressure, or by free incision. Occasionally a gonorrhœa of the duct of the Bartholinian gland persists so that the duct requires to be laid open.

PRURITUS VULVÆ.

Definition. An irritable condition of the external genitals producing excessive itchiness.

Pathology. The irritable region is at the upper convergent angle of the labia majora at the mons veneris; it may extend from that over the vestibule and the vaginal orifice, and sometimes over the mons veneris on to the abdomen. The pathological changes in the skin which produce this irritability are not known, because the cases are not seen in an early stage. By the time that the irritation has become so unbearable that advice is sought, the skin is inflamed and excoriated by continued scratching which masks its original condition.

Etiology. Any irritating discharges from the vagina as in carcinoma, and even simple leucorrhœa as from senile vaginitis, may produce it. It occurs in diabetes—due to irritation from the sugar in the urine (*Friedreich*)—and in affections of the kidney and bladder, just as similar conditions produce irritation of the penis in man. In children, it accompanies vulvitis and has been traced to the passing of the *Oxyuris Vermicularis* from the anus to the vulva. It is also caused by whatever produces congestion of the labia—hence its occurrence at the menstrual period and in early pregnancy; by irritable skin affections as herpes, eczema, and the parasitic eczema marginatum; and by pediculi.

Symptoms. The irritation is not continuous but recurs periodically. In some cases, it appears only after taking a long walk or after getting warm in bed; sometimes it is most marked before the menstrual period. The irritability is slight at first but becomes aggravated by scratching. To obtain this temporary relief, the patient gradually avoids company and this, along with the constant irritation, has led in some cases to nervous depression and melancholia; sometimes the practice of masturbation is learned at the same time, and the consequent nervous symptoms gravely complicate the case.

Diagnosis. As the most hopeful cases for treatment are those in which a distinct removable cause is found, a thorough examination is necessary: (1) Carefully inspect the external genitals for irritating skin eruptions, and examine scrapings of the affected parts microscopically for parasites; (2) expose the vagina and cervix thoroughly with the speculum to ascertain whether there is irritating leucorrhœa, the plugging of the vagina with cotton wadding to check discharge from the vagina or cervix will help us to exclude this (*Thomas*); (3) test the urine for albumen and sugar; (4) examine per rectum for any source of irritation there.

Treatment of Pruritus.

Treatment. We must first remove the cause. When parasites are present, the mercurial or sulphur ointment is required; with vaginal or cervical catarrh, a tampon of wadding and glycerine (with acetate of lead ʒii to ℥i) in the vagina will check the irritating discharge. Attention to diet (which should consist largely of vegetables) and to the regular action of the bowels is necessary; when the gouty diathesis (with which pruritus is often associated in old patients) is present, lithia water is useful. It is a safe rule to forbid all stimulants. Frequent vaginal injections or sponging with warm water, followed by the application of boracic ointment or bismuth, will relieve mild cases; in more severe, the patient should have, several times a day, a warm sitz-bath combined with the douche; after this, iodoform is dusted over the vestibule or, if the patient is recumbent, lint soaked in acetate of lead and opium lotion is laid between the separated labia. In some cases, chloroform and almond oil have given relief (*Scanzoni*).

℞ Chloroformi ʒii.
Olei amygdalae ℥ii. M.
Sig. Apply externally as directed.

Preparations of mercury give benefit in other cases.

℞ Hydrargyri perchloridi ʒss.
Aquæ ℥vi. M.
Sig. Apply externally as directed.

Schroeder has seen very good results from the application of carbolic acid of varying strength—1 to 40 up to 1 to 10. Solid menthol is also used. Where milder measures have failed, solid nitrate of silver well rubbed into the irritated parts and followed by cold water dressing has given relief. In parasitic cases a lotion of equal parts of sulphurous acid and glycerine may be used. To procure rest at night, morphina and chloral may be necessary; Hildebrandt has found tinct. cannabis Indicæ (m. 10-20) even more effective than these. A 4 per cent.

solution of cocaine may be tried. Application of galvanic current has been used with success.[1]

ERUPTIONS ON THE VULVA.

The skin round the vulvar orifice may be affected with any of the eruptions found on other parts of the body. Of these the most important are erysipelas, eczema, prurigo, herpes, acne. These eruptions have the same character as when they occur in other situations, and their treatment is the same. Condylomata may be found on the skin, and mucous patches over mucous surfaces. Eczema is frequently caused by diabetes, according to Lécorché.[2] Hebra's plates of Skin Diseases illustrate these conditions very well; see also a paper in the Annales de Dermatologie et Syphilographie for April 1882, by Gougenheim and Soyer.

TUMOURS OF THE VULVA.

Under these we shall notice briefly—

Cysts of the Bartholinian glands,
Elephantiasis,
Neuroma,
Fibroma,
Lipoma,
Carcinoma,
Sarcoma,
Lupus,
Kraurosis.

This is also the most convenient place to refer to

Pudendal hernia,
Varix, hæmatoma and hæmorrhage.

Cysts and Abscess of Bartholinian gland.

Cysts of the Bartholinian glands. The Bartholinian or vulvo-vaginal glands, which are the analogue of Cowper's glands in the male, are situated at each side of the ostium vaginæ (see fig. 7); their ducts (about 2 cm. long and wide enough to admit a fine probe) run upwards to about the middle of the ostium vaginæ, where their mouths may be seen in front of the hymen.

A cyst may form by dilatation of the *ducts* or of the *glands* themselves. When due to distension of the duct, it has at first an elongated oval form; when the gland itself is affected, there may be multiple cysts or a lobulated swelling. They generally occur on the left side.[3] The contents are thick mucus, which is clear or of a brownish tinge. Suppuration may occur and abscess form (*v.* fig. 324).

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[1] Blackwood, *Polyclinic*, 1885, No. 9; and v. Campe, *Central. f. Gyn.*, Bd. XI., S. 521.
[2] Du diabéte dans ses rapports avec la vie utérine, etc.: *Annales de Gyn.*, Oct. 1885.
[3] Bonnet—*Gaz. des Hôpitaux*, 1888, No. 69.

The symptoms are due to the discomfort of the swelling, which is most felt on walking. The diagnosis is easy, from the position of the swelling and its fluctuating character; when it has developed during the puerperium, we must differentiate it from hæmatoma (which after a time becomes firm from coagulation) and inflammation after injury.

The treatment consists in complete evacuation of the cyst and destruction of its walls. It is not sufficient to open it and allow the fluid to escape; we must cut out a portion of the wall and then plug the cyst with antiseptic lint. By far the best instrument is the thermo-cautery: we first puncture the cyst with it; when the fluid has escaped, we pick up the outer cyst wall with forceps and lay it fairly open with the cautery; we then cauterise the inner wall also. A piece of antiseptic lint is laid over the wound.

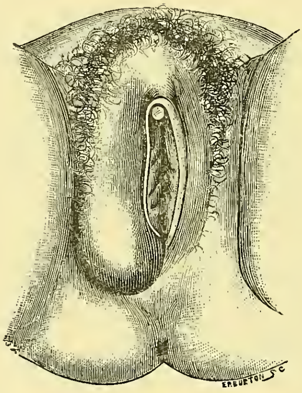

FIG. 324.
ABSCESS OF THE BARTHOLINIAN GLAND (*Huguier*).

Cysts also occur in the labia minora;[1] they are very rare and their pathology is not known.

Elephantiasis.

Elephantiasis. This is a common condition in tropical countries, but is comparatively rare in Europe and America although a minor degree of it is occasionally met with.

The pathological changes consist in a dilatation of the lymphatic spaces and ducts, with secondary formation of connective tissue and thickening of the layers of the cutis vera; sometimes the papillæ are specially enlarged, producing swellings which resemble condylomata in form. The labia majora are most frequently affected, next in frequency the clitoris; more rarely are the labia minora hypertrophied (*Mayer*).

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[1] Smith removed two such cysts: *Brit. Med. Journ.*, 1888, I., 250.

It develops, according to Mayer, most frequently at ages of from 20 to 30 years—that is in the period of sexual activity. It has been traced to direct injury, but the most fruitful cause of minor degrees of hypertrophy is syphilis.

The symptoms are due to the weight and discomfort of the tumour which may reach to the knees. For drawings of the various forms, Esmarck and Kulenkampff's monograph Die Elephantiaschenformen (Hamburg 1885) may be consulted. The treatment of the larger growths is removal with the thermo-cautery.

Neuroma.

Neuroma, an exquisitely sensitive red papule which resembles a urethral caruncle, has been described by Sir J. Y. Simpson (see fig. 353); its occurrence, except at the urethral orifice, is extremely rare.

Fibroma.

Fibroma. This springs from the labia majora, resembles in structure fibroid tumours of the uterus, and, like them, is embedded in cellular tissue or hangs down by a pedicle. Taylor has reported a case of fibroid of the vestibule.[1]

Lipoma.

Lipoma may arise from the fatty tissue of the mons veneris or labia majora. Emmet[2] describes a case in which the tumour hung down to the patient's knees and was supported in a bag round the waist; Stiegele[3] removed one which weighed 10 lbs.

Carcinoma.

Carcinoma of the vulva is rare in comparison with its frequency in the uterus. In 16,637 cases of tumours of the female sexual organs, Gwilt found that 7479 were cancerous; and of these, 72 (or 1 per cent.) were vulvar. The most frequent form is the cancroid (*West*). It begins, usually on the inner surface of the labia majora, as small round nodules which elevate the skin; they may remain for a long time unnoticed, as their growth is at first slow and painless. After ulceration they spread more rapidly, and extend forwards and backwards but rarely into the vagina. The section of such a nodule is shown in Plate XIII. fig. 2. It is important to diagnose it from lupus, which may so closely resemble it that certainty is only got by microscopic examination. The inguinal glands are early involved.

Complete removal before the glands are affected, is the only treatment. As the growth is accessible, there seems a prospect of cure; during the last few years cases are reported by Schroeder and others of extirpation without recurrence, but the time elapsed is too short to justify definite conclusions. Küstner has advocated removal of the inguinal glands of the affected side if these are larger than those on the healthy side.

Plate XIII. fig. 1 shows a section of an interesting case of epithelioma of the clitoris reported by Simmons. In the position of the clitoris, there was an irregular nodular mass with a soft friable centre and indurated prominent uneven margins. The growth was removed by A. R. Simpson; wire sutures were passed underneath the tumour which was then cut away, bleeding points tied with catgut and the margins of the wound drawn together with the sutures. Primary epithelioma of the clitoris is a rare condition; only five other cases are given in Simmons' paper.

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[1] *Americ. Journ. Obstet.*, 1888, p. 434.

[2] *Op. cit.*, p. 601.

[3] *Zeits. f. Chir. u. Geb.*, Bd. IX., S. 243.

Sarcoma of the vulva is very rare. Geith and Terrillon[1] have recorded cases of melanotic sarcoma. Haeckel has collected 10 cases of melanotic tumours,[2] mostly sarcomatous.

Lupus Vulvæ.

Lupus vulvæ is a condition drawn attention to by Huguier, West, Taylor, Matthews Duncan, Macdonald, and Peckham. Duncan has recently considered it very fully, and an able histological examination of his specimens has been made by George Thin. It may be defined as a slow chronic hypertrophic condition of the pudenda, prone to ulcerate and erode, causing little pain, lasting long, and not infecting neighbouring glands or causing ill-health.

Pathology.

As to its pathology, it is a hypertrophic condition with tendency to ulcerate and cause stricture of urethra, vagina, or rectum. Pus is secreted by the ulcerated surface, and occasionally considerable destruction of parts is caused. The hypertrophy may be small (lupus minimus), large (lupus hypertrophicus), or forming irregular masses extending to the hip. Other terms have been used, viz., lupus prominens, lupus serpiginosus; it was termed by Huguier, "Herpes l'Esthiomène."

Microscopic Examination.

On microscopic examination, Thin found growth of fibrous tissue (ordinary white fibrous tissue) and absence of any neoplastic structure; exudation cells were also present. Blood-vessels were unusually numerous. The appearances thus differ from lupus vulgaris, cancer, or syphilis; they are somewhat analogous to elephantiasis, but differ from that condition in the non-implication of the lymphatics and the presence of inflammatory action.

Symptoms and Physical Signs.

The symptoms may be slight and not attract the patient's attention unless hæmorrhage or inflammation occurs. The physical signs are those of hypertrophy, ulceration, erosion, lasting for years, not implicating glands, and not markedly affecting the patient's health. Large hypertrophies usually affect the clitoris and labia majora; small ones, the urethral orifice and hymen (*Duncan*). The vagina and uterus may become affected.

Diagnosis.

The condition is rare, but good drawings are given by Duncan. It must be diagnosed from epithelioma and syphilis. Epithelioma is harder, implicates glands soon, and has shallow ulcerations. In syphilis, the history is the great test. Jonathan Hutchinson alleges, however, that this lupus is really due to tertiary syphilis. There is good reason to believe that pudendal lupus is not lupus vulgaris, cancer, syphilis, nor elephantiasis, but is an affection *sui generis* whose etiology is unknown. The term "lupus" is thus a clinical one.

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[1] *Ann. de Gyn.*, XXVI., p. 1.

[2] *Archiv f. Gyn.*, XXXII., p. 400.

Prognosis.

The prognosis is fairly good. Many can be relieved and some cured. In treatment, hypertrophied or ulcerated portions are removed or cauterised with Paquelin's cautery, and the patient put on arsenic and iron.

Kraurosis Vulvæ.

Kraurosis Vulvæ or Atrophy of the Genitals. In old women, the pudenda shrink; the labia minora become very small; the vestibule atrophies and shrinks, making the urethral orifice patulous and causing painful ulceration (*v.* fig. 353).

Microscopically, Breisky found the sebaceous glands of the labia few, a cicatricial condition of the papillæ and thinness of the rete Malpighii. The sweat glands were also diminished in number.

Pudendal Hernia.

Pudendal hernia. This corresponds with scrotal hernia in the male. The round ligaments are the analogues of the spermatic cord, and after emerging from the inguinal canal pass into the substance of the labia majora which correspond to the scrotum; if the process of peritoneum surrounding the round ligaments—known as the canal of Nuck—does not become obliterated at birth, it forms a track for the hernia.

Though it be very rare, the possibility of a hernia must be kept in mind on examining a tumour of the labia; the crackling feeling, the impulse communicated on coughing, and disappearance on taxis, indicate hernia. The serious consequences of cutting into such a hernia by mistake for an abscess, are self-evident.

Varix.

Varix. The plexus of veins which forms the erectile tissue of the bulbi vaginæ has been already referred to (*v.* p. 10 and fig. 7). A varicose condition of the veins sometimes occurs in pregnancy and with pelvic tumours. In a case described by Holden,[1] they formed, when the patient was erect, a tumour of the size of a child's head. When these vessels rupture and the blood is effused into the cellular tissue, a hæmatoma is formed.

Hæmatoma.

Hæmatoma. This condition is also called "Thrombus" and "Hæmatocele" of the vulva; the former term should be limited to a coagulum within a vein, and the latter to blood effusion into the peritoneal cavity. It arises most frequently during labour, from injury produced by the child's head; the effusion may appear rapidly, as a tumour from the size of a walnut to an orange or larger, or may take place gradually. It has also been known to occur independent of labour or pregnancy, as the result of a blow or violent muscular effort.

The treatment consists in the application of ice to the vulva, and regular evacuation of the bladder and rectum without the patient's being allowed to strain. With this treatment, the mass may be absorbed. Should inflammation occur, poultices are applied and pus is evacuated with the knife; if this occurs in the puerperal condition, special care is required to keep the wound aseptic by repeated washing with carbolic solution and dressing with carbolised lint.

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[1] "Immense Vulvar and Vaginal Varix:" *N.Y. Med. Record*, July 1868.

External Hæmorrhage.

External hæmorrhage from ruptured veins sometimes occurs. The rupture may be caused by muscular straining, or by a blow or wound of the vulva. The dilated state of the veins makes such an injury serious during pregnancy, and several cases of a fatal result from a blow or kick have been the subject of a criminal prosecution (*Sir J. Y. Simpson*). The vascular tissues are forcibly driven against the pubic arch and cut on it. In a case recorded by Hyde,[1] hæmorrhage from a vein ruptured by a fall proved fatal in forty minutes. Those who suffer from varicose veins should lie down for some hours during each day; should a vein rupture, the patient must lie down at once and apply pressure to the bleeding point.

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[1] *Lond. Obst. Trans.*, Vol. XI.

CHAPTER XLVIII.

RUPTURE OF THE PERINEUM AND ITS OPERATIVE TREATMENT.

LITERATURE.

Bantock, G.—On the treatment of Rupture of the Female Perineum, Immediate and Remote: London, 1878. *Collis*—Dub. J. Med. Sc., May 1861. *Duncan, John*—Concerning the Closure of Abnormal Anus: Lancet, 1873, Vol. II., p. 9. *Duncan, Matthews*—Papers on the Female Perineum: Churchill, London, 1879. *Emmet*—Principles and Practice of Gynecology: Third Edition: Philadelphia, 1884. *Fritsch* — Ueber Perineoplastik: Centr. für Gynäk., 1887, No. 30. *Goodell*—Lessons in Gynecology: Philadelphia, 1880. *Hart, D. B.*—The Structural Anatomy of the Female Pelvic Floor: Edin., 1880. *Heiberg*—Om Perinäoraphi, saerligt med. Hensyn til Lawson Tait's Methode: Gynäkalog. og obst. Meddel., Bd. vi., Hft. 3, 1887. *Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien: Stuttgart, 1877. *Malthe*—Norsk Magazin for Laejevid. enskaben, II. Reihe, 24 Bd. (describes Voss' Method). *Sänger*—Ueber Perineorraphie durch Spaltung des Septum rectovaginale und Lapeenbildung: Volkmann's Sammlung, No 301. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane, S. 542: Leipzig, 1887. *Simpson, Sir J. Y.*—Diseases of Women, p. 644. *Tait, Lawson*—A New Method of Operation for Repair of the Female Perineum: Tr. Lond. Obst. Soc., 1880. Diseases of Women and abdominal Surgery, Vol. I., pp. 68-71. *Thomas*—Diseases of Women, p. 165: Philadelphia, 1880. See *Duncan* and *Hildebrandt* for literature; also Index in Appendix.

Preliminaries.

Preliminaries and Nomenclature.—The question as to the significance of rupture of the perineum is still debated, some authors believing it to be of no importance unless involving the anus and leading to incontinence of fæces, others holding that it is an important lesion even when not so extensive as to involve the bowel. The relation of rupture of perineum to prolapsus uteri is discussed in the next chapter: at present we consider rupture apart from this. The views advanced in Chapters II. and IV. must be kept in mind. The student should glance over these and look at the figures in Plates I.—III.

Complete rupture into the anus is serious as it entails incontinence of fæces, as well as rectocele and some sinking of the pelvic floor from the partial loss of the bracing-up action of the levatores ani (*v.* p. 38).

Another point to be kept in mind is the anatomy of the triangular ligament. This is a piece of sheet fascia filling up the pubic arch and perforated by the vagina and urethra. It strengthens the vaginal walls by its grip and, according to Emmet, prevents their eversion. He believes that the bearing down complained of by some women and associated with a lax condition of the vaginal walls or the existence of rectocele is due to undue distention of this fascia and separation of its lateral attachments: and he bases on this a special operation to be described shortly.

It will be most convenient to retain the nomenclature already used in the Section on Anatomy. The pelvic floor is made up of pubic and sacral segments, as already defined; in labour, each of these behaves characteristically—the pubic segment is drawn up, the sacral one driven down (Chap. IV. and fig. 53).

In this chapter we are specially concerned with the sacral segment. During parturition it is driven downwards and backwards by the advancing fœtus and is more or less torn at its inferior angle. The term perineum is often vaguely applied; in this Chapter, however, the perineum is defined as *the inferior angle of the sacral segment* (*v.* p. 60). Fig. 325 shows the perineum. At its lower end, this part of the pelvic floor is made up of the following:—

1. Posterior vaginal wall in front of upper part of perineal body.
2. Hymen,
3. Fossa Navicularis,
4. Fourchette,
5. Perineal body and skin over its base.

These are mesial structures; laterally, we have the labia majora and minora.

The perineal body lies in greater part below the level of the vaginal entrance and has as its functions—

(1.) The union of the following muscles — levator ani, bulbocavernosus, transversus perinei, sphincter ani;
(2.) The directing backwards of the anus;
(3.) The strengthening of a part much stretched during parturition.

PATHOLOGY AND VARIETIES.

Pathology and Varieties.

It should be kept in mind that the vaginal orifice is transverse, the vulvar orifice antero-posterior.

When the fœtal head is passing through the vaginal orifice, it distends it all round; while, when passing through the vulvar orifice, it distends the lower half of this only, *i.e.*, it does not stretch so much those parts of the vulva lying above the level of the meatus urinarius.

As the result of normal and abnormal child-birth, we get certain tears of the inferior end of the perineum. In all primiparæ there is laceration of at least the hymeneal orifice, usually mesial and posterior — the "inevitable laceration" of Matthews Duncan. There may be also laceration of the following structures: (*a*) the vaginal orifice, radiating; (*b*) vestibule; (*c*) fourchette; (*d*) labia minora; (*e*) perineal body to a varying depth, the most extensive involving the sphincter ani. Further, there is sometimes central rupture of the perineum. In this lesion, the skin over the base of the perineal body alone may be involved or only the vagina may be torn. Rarely is it a lesion of vaginal wall, connective tissue, and skin, with an unruptured band of tissue between it and the fourchette (fig. 326); this, therefore, is a perforation through the inferior angle of the thinned-out sacral segment.

ETIOLOGY.

The following causes produce rupture in parturition :— Etiology.

(1) Passage of a large head or of an occipito-posterior rotated into sacrum; passage of the shoulders;
(2) Narrowness of pubic arch;
(3) Straightness of sacrum, as in flat or rickety pelvis;

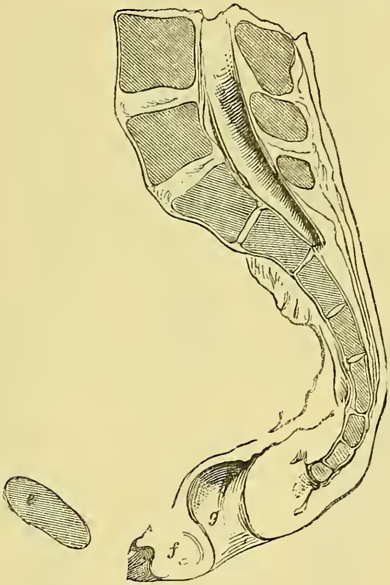

Fig. 325.
The Sacral or supporting Segment of the Pelvic Floor (*Hart*). *e* Symphysis pubis; *f* perineum or inferior angle of sacral segment; *g* anus.

(4) Syphilitic ulceration;
(5) Rigidity of parts in elderly primiparæ;
(6) Careless use of forceps;
(7) Too early passage of hand into vagina to bring down arms in turning.

Comment on these would lead us too much into Obstetrics.

SIGNIFICANCE OF RUPTURE OF PERINEUM.

Rupture of the perineum involving the sphincter ani and leading to complete or partial incontinence of fæces is an important lesion and imperatively demands operation.

Rupture of the perineum alone and not involving the sphincter ani may give rise to no symptoms unless associated with other conditions causing prolapsus uteri. According to Emmet, the real accident in some cases of ruptured perineum is tear of the triangular ligament where it is perforated by the vagina, but probably tear of muscle there is of greater importance.

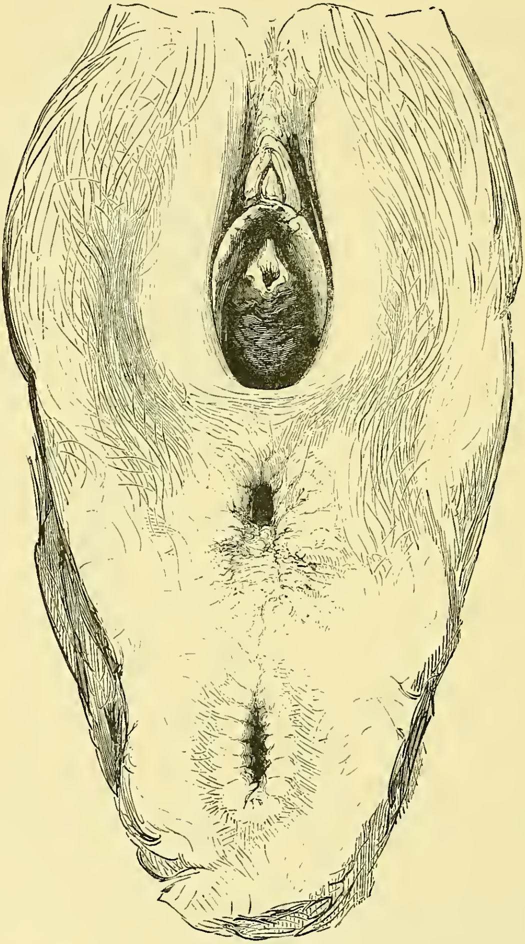

Fig. 326.

Central Rupture of the Perineum, the child was born not through the Vulva but through the Ruptured Opening (*Sir J. Y. Simpson*).

TREATMENT.

Treatment. We take this up under the following heads :—

a. Prophylactic ;

b. Operative, immediate and deferred.

Prophylactic.

a. Prophylactic. This properly belongs to midwifery. The obstetrician is too apt to think of the perineum as something that delays the exit of the fœtal head, and to forget the gynecological aspect—that it is part of the supporting segment of the pelvic floor. Extensive tear of this during labour means not only a larger raw surface for septic absorption, but is also one factor predisposing to prolapsus uteri. The question, therefore, of guarding the head during its passage over the perineum is of importance but belongs to obstetrics. We may note however that the fœtal head, in passing through the outlet, drives the sacral segment back and glides forward in a direction parallel to the driven-back posterior vaginal wall. The normal curve of the sacrum favours this latter motion.

The perineum may tear (1) from over-distension of the orifice, or (2) from the too forcible driving of the fœtal head against it, *i.e.*, at right angles to the perineum; (3) from descent of the sinciput owing to fixation of the occiput and thus substitution of the larger diameters of the head for the sub-occipito bregmatic.

Operative.

b. Operative treatment, (1) immediate and (2) deferred. No practitioner should leave a labour case until he is satisfied, by actual inspection or digital examination, as to the amount of perineal tear. When the sphincter ani is involved, the operation is on no account to be deferred but must be performed at the conclusion of the third stage. The practitioner should never run the risk of his patient's having incontinence of fæces.

(1.) *Immediate operation.* This belongs to obstetrics.

Deferred Operation.

(2.) *Deferred operation.* This may be to operate for a rupture through the sphincter or to repair the perineal body. At present we consider only the former.

Preliminary remarks. In complete tear through the anus, the external sphincter, internal sphincter, and levator ani are torn. Fig. 327 shows this clearly, and also explains what has to be done. What is wanted is not skin union, but some operative measure by which the torn muscular ends can be vivified and united.

Diagnosis of long-standing rupture of perineum into anus. The patient complains of inability to control the passage of flatus or of fæcal matter when a call to stool happens; she is especially troubled when diarrhœa is present. Sometimes there is a certain amount of control, when some of the fibres of the upper margin of the internal sphincter are intact. Patients in the lower classes occasionally treat this unpleasant condition as of little moment; to a woman of any refinement, the condition is a most distressing one.

On inspection, the practitioner notes that the skin surface between the vaginal and anal apertures is gone, so that these apertures are blended. The finger passed into the rectum feels no muscular constriction, and notes that the anterior and posterior rectal walls are in contact. The perineal body appears to be gone, and a V-shaped projection of cicatrised mucous membrane (apex above) is all that remains of it.

Operation for restoration of function of sphincter ani. The patient's bowels are first freely cleared out by castor-oil and enemata so as to ensure that no scybala remain.

Requisites. The instruments requisite are the following :—

Angled scissors,
Two pairs of artery forceps,
Péan's forceps,
Catgut ligatures,

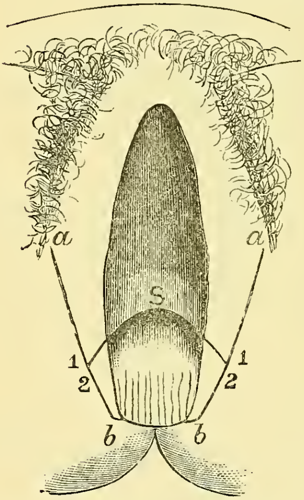

Fig. 327.
Lines of Incision in Operation for Repair of Rupture of Perineum through Sphincter Ani. For letters see p. 559.

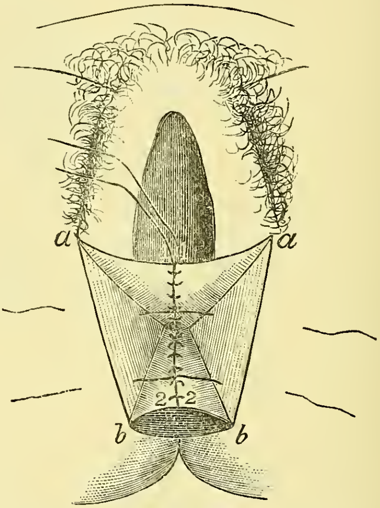

Fig. 328.
Passing of Sutures in same Operation. For letters see p. 559. The deep sutures are to be passed nearer the skin edge.

Silkworm gut or silver wire,
Operating douche,
Fully curved needles, large and small,
Needle holder.

Methods. The patient is chloroformed and placed opposite a good light in the lithotomy posture. The knees are held by assistants as follows. Each stands facing the light, and places a knee of the patient under the arm-pit next to it; with the hand of the same arm, he exercises tension on the nates as the operator wishes. With his other hand, the assistant controls the patient's foot.

The stages of the operation are—(1) Forming flaps with scissors, (2) Applying the stitches.

A. R. Simpson's Operation.

The flaps, as made by A. R. Simpson, are shown in fig. 327. The point of the lower blade of the angled scissors is entered at *b*, pushed up to *a*, and then a clip made so as to expose tissue in line *b a*. The point is next entered at 1 on the left side, and pushed between the vaginal and rectal mucous surfaces, *i.e.*, along the loose connective tissue between these until the point emerges at 1 on the right side. A clip is then made so as to expose tissue in the line 1 S 1. Lastly, the point of the scissors is entered at *b* (right side), and *a b* clipped as already given on the left side. In this way an H-shaped figure is cut out (fig. 330*b*). These clipped-out lines map out four flaps which are now to be raised so as to expose for union the muscular tissue lying beneath. The flaps are best raised as follows :—Lay hold of flap S 1 *a* (left) at angle 1, with Péan's forceps, and raise it by clipping : do the same with flap S 1 *a* on right side. While the flap is being raised, the index or middle finger of the left hand is kept on its vaginal aspect so as to regulate its thickness. The rectal flaps 2 S *b* are then treated in the same way, the angle 2 of each being seized with the forceps. In this way a quadrilateral surface is now laid bare, with the muscular ends of the external and internal sphincters as well as the interlacings of the various muscles of the perineal body. Fig. 330*d* will make this clear.

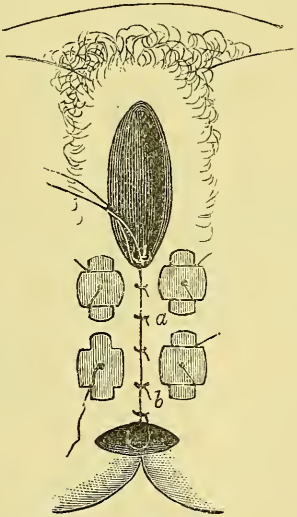

FIG. 329.

RESULT OF SAME OPERATION. Instead of being fixed with button-plates, the deep sutures can be simply tied like the superficial ones.

The sutures are now to be passed as follows :—The point of the needle armed with silkworm gut is entered inside the skin, carried across, either completely below the tissue or only above the surface at the apex of

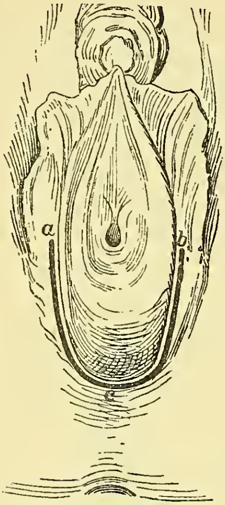

FIG. 330*a*.

EXTERNAL GENITALS IN A MULTIPARA, WITH TEAR OF PERINEUM SHOWING LINE OF OPERATION (*a c b*) FOR LAWSON TAIT'S OPERATION.

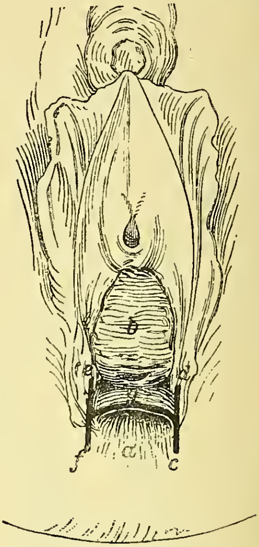

FIG. 330*b*.

DIAGRAM SHOWING RUPTURE INTO ANUS AND LINE OF OPERATION (*f e g d c*). Anterior vaginal wall (*b*); anus (*a*); *g* is on posterior vaginal wall.

the wound, and made to emerge on the other side within the skin sur-

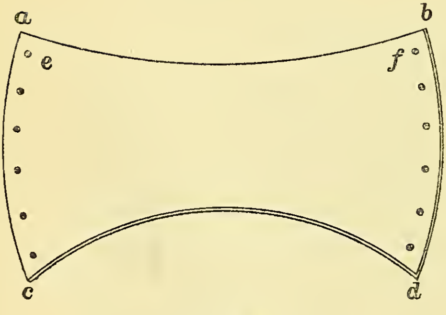

FIG. 330*c*.

SHAPE OF RAWED SURFACE AFTER FLAPS HAVE BEEN DISSECTED UP AND DOWN; *e* and *f* show relation of stitches to skin edge.

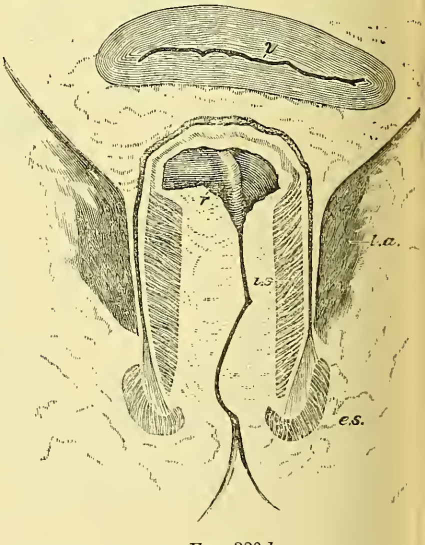

FIG. 330*d*.

CORONAL SECTION THROUGH ANUS (*Symington*). *r* rectum; *i s* internal sphincter; *e s* external sphincte *l a* levator ani; *v* vagina.

face (fig. 330*c*). The lowest stitches should pick up and unite the edges of the external and internal sphincter (*v.* fig. G). The sutures when tied do not include the skin, and cause no pain to the patient. The vaginal flaps are left alone. The mucous membrane of the rectal flaps may be sutured with catgut, but it is unnecessary. Bleeding, which can be checked by a stream of very hot water (110°–120° F.) or by Péan's forceps, should have ceased before we tie these sutures (fig. 329). They should be left in for a fortnight and then removed. This is a little troublesome, as they are apt to become buried. The best way to remove them is to have the patient in the lithotomy posture, to lay hold of both ends of the suture and pull it to the one side, with the rake picking up the loop (fig. 391).

The advantages of this method of operating are very great. It can be done very rapidly, ensures muscular union, does not allow skin or mucous membrane to interfere with the union of muscle, and is a great improvement on the old methods. In these the union often seemed sound, but the patient had no additional control from want of muscular union.

This method is not, strictly speaking, that of one operator, but has been evolved as follows:—In 1872 John Duncan closed an artificial anus following gangrenous femoral hernia by dissecting up the mucous membrane round the orifice for more than half an inch, invaginating this dissected portion and bringing the raw surfaces together with interrupted catgut sutures: the margins of the skin were then pared and brought together by wire.

Collis, of Dublin, in 1861, in a case of vesico-vaginal fistula split the edges of the fistula instead of paring them. A. Russell Simpson applied the separation of the mucous membrane introduced by Duncan, to tear of the perineum involving the anus, splitting the septum between anus and vagina and sewing similar mucous membranes to each other as well as bringing the deep raw surfaces into union. This procedure really forms vaginal and rectal flaps. Lawson Tait improved on this by the use of angled scissors, and also introduced the method of passing the sutures inside of the skin instead of through it as formerly done.

The use of scissors to form flaps is also applicable in perineum operations where the anus is not torn. According to Sänger, Stein, a Danish surgeon, and Voss, a Norwegian, have employed somewhat similar methods in complete rupture.

The continuous spiral catgut suture is now much used in Germany in such cases and has many advantages. It is very quickly passed, brings the surfaces well into apposition and does not require to be removed. The catgut used must be specially prepared with oil of juniper and corrosive sublimate so as to be aseptic and last 8 or 9 days.

In this operation it is to be used as follows. With a curved rounded needle begin at the apex of the rectal surfaces and knot the first stitch securely. Then pass the suture continuously to the lower end of the rectal stitches, up the intermediate portions, and finally unite the vaginal flaps and any skin portion un-untied. The last stitch is securely knotted of course.

After-treatment. The patient's food must be liquid and not too abundant. The bowels are to be confined for 3 days and then moved by a small dose of castor-oil every second day. Prior to the motion, the nurse must inject a large amount of oil and see that scybala if present are broken down. Unless the nurse is skilled, the operator or his assistant must attend to this. The stitches are removed on the 14th to 21st day.

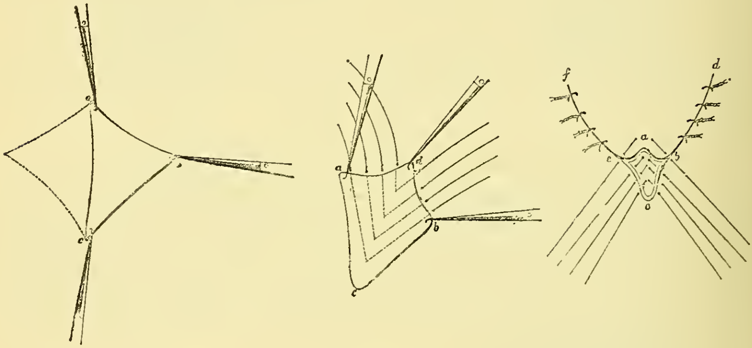

FIG. 331.
EMMET'S OPERATION FOR RUPTURED PERINEUM (*Dudley*).[1]

Operation for Rupture of the Perineum, the Sphincter ani not being involved. This is described in chapter on Prolapsus uteri.

Emmet has devised an operation with the view of restoring the grip of the fascia, forming the triangular ligament, upon the vaginal wall. A double triangular raw surface is made on the posterior vaginal walls. One of these is seen at *a b c* (fig. 331) stretched by three tenacula. The sutures are now passed along the upper margin in loops so as to fold this edge *a b* on itself at its central point *d*, which is hooked up in a fourth tenaculum. The third figure shows this done on both sides and these sutures tied. Finally, additional sutures are passed through the edge *b c* so as to unite it with the corresponding part of the other triangular raw surface.

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[1] Pepper's *System of Medicine*, Vol. IV., pp. 164, 165.—London: Sampson Low, Marston, Searle, and Rivington, 1886.

CHAPTER XLIX.

DISPLACEMENTS OF PELVIC FLOOR: PROLAPSUS UTERI; VAGINAL ENTEROCELE.

LITERATURE.

Alexander—The Treatment of Backward Displacements of the Uterus and of Prolapsus Uteri by the New Method of Shortening the Round Ligaments: London, Churchill, 1884. *Duncan, Matthews*—Papers on the Female Perineum: Churchill, London, 1879. *Emmet*—Principles and Practice of Gynecology, p. 367: Lond. 1879. *Freund, W. A.*—Ueber die Figur des normalen Lumen vaginæ und über Dammplastik mit Demonstrationen: Arch. f. Gyn., Bd. VI., p. 317. *Fritsch*—Die Lageveränderungen der Gebärmutter, Billroth's Handbuch: Stuttgart, 1879. *Goodell*—Lessons in Gynecology, Lesson VII.: Philadelphia, 1879. *Hart*—The Structural Anatomy of the Female Pelvic Floor: Edinburgh, 1880. *Hegar und Kaltenbach*—Operative Gynäkologie, 1881. *Huguier*—Mémoir sur les Allongements Hypertrophiques du Col de l'Utérus: Paris, 1860. *Legendre*—De la chûte de l'Utérus. *Martin*—Ueber den Scheiden und Gebärmuttervorfall: Volk. Samml., Nos. 183, 184. *Schatz*—Ueber die Zerreissungen des Muskulösen Beckenbodens bei der Geburt: Archiv f. Gyn., XXII., S. 298. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1879. *Schultze*—Die Pathologie und Therapie der Lageveränderungen der Gebärmutter: Berlin, 1881. *Schütz*—Medianschnitt durch das Becken einer Frau mit Scheiden und Uterus Vorfall: Arch. f. Gyn., Bd. XIII., S. 262. *Sims, Marion*—Uterine Surgery: London, 1865. *Skene*—Injuries to the Pelvic Floor from Parturition and Other Causes: N. Y. Med. Jour., Vol. XLI., 1885. *Spiegelberg*—Ein anderer Medianschnitt durch ein Becken mit Scheiden Gebärmutter-Vorfall: Archiv f. Gyn., Bd. XIII., S. 271. *Thomas*—Diseases of Women, p. 168: Philadelphia, 1880. *Veit*—Klinische Untersuchungen über den Vorfall der Scheide und der Gebärmutter: Zeits. f. Geb. u. Gyn., Bd. I. *Winckel*—Die Pathologie der weiblichen Sexualorgane: Leipzig, 1880. See also Index of Recent Gynecological Literature in the Appendix.

Preliminaries.

Preliminary Considerations. The subject of this chapter can only be understood in the light of an accurate knowledge of the normal structural anatomy of the pelvic floor, and a consideration of the changes it undergoes during parturition, and in the displacements to be considered. Our information on the last point leaves, however, much to be desired. The student should read over Chap. IV.

We note here that the pelvic floor is to be considered as made up of the two portions termed the "entire displaceable" and "entire fixed."

Fig. 325 shows a sagittal mesial section of the pelvis with the "entire displaceable portion" removed and the entire fixed portion left: Pl. II., fig. 2, shows the two portions in axial coronal section.

These two portions are separated by loose connective tissue. During parturition the child is driven through the vagina, *i.e.*, through the pelvic floor, which becomes canalized or opened up through this process. If we regard this process only in sagittal mesial section as shown in Braune's plate, we see that the pubic segment is drawn up and the sacral one driven down and back and the vagina in addition greatly distended. If considered in axial coronal section we should see the "entire displaceable portion" in part drawn up, the fœtus driven through it and thus the levatores ani and glutei muscles in the "entire fixed portion" driven out and back and the former perhaps torn (*Schatz*) or at any rate elongated, and their slope diminished. The slit in the triangular ligament through which the vagina passes is also dilated, and may be unduly so. The upward traction exercised on the "entire displaceable portion" necessarily elongates or slackens the loose connective tissue joining the two portions and is one factor in bringing about prolapsus uteri. As the result therefore of the structure of the pelvic floor, of lesions caused by parturition, and intra-abdominal pressure, we may get certain conditions, viz.,

I. Undue yielding or bulge of the pelvic floor;
II. Prolapse of the "entire displaceable portion" with the uterus and abdominal viscera, in part, past the "entire fixed portion"—so-called prolapsus uteri:
III. Vaginal enterocele,—anterior and posterior.

1. *Undue yielding or bulge of the whole pelvic floor.* This is a condition to which attention has been drawn by Herman and Skene. Our knowledge on this lesion is however very defective and calls for investigation. In Chap. IV. attention has been called to the normal pelvic-floor projection. In undue bulging of the pelvic floor this is increased. Herman measures with a tape the length of the arc described by the curved skin aspect of the pelvic floor between tip of coccyx and lower margin of symphysis pubis. This average, about four inches, may be increased by straining, in virgin cases, to four and a half inches; but in cases of undue bulge, to about six or more.

Causation. This lesion is due to parturition; we are not yet in a position to give precise details, owing to the complete want of sectional and dissectional work on the pelves of women with such a prolapsed condition. Schatz and Skene have described certain conditions of laceration of the levator ani muscles, atrophy and permanent paralysis, but all has been based on clinical investigation uncorrected by anatomical examination. The subject however is important, the researches so far suggestive, and further accurate work called for.

The *symptoms* of undue yielding are bearing down pain with draggings in loins and hips.

The *treatment* is the use of an abdominal belt with a perineal band.

II. PROLAPSUS UTERI.

DEFINITION.

A downward displacement of entire displaceable portion of pelvic floor, uterus and appendages, past entire fixed portion; with coincident descent of small intestine.

PRELIMINARIES.

The subject of Prolapsus Uteri is a complex one, and has been in part made so by erroneous terminology.

Thus the well-known term Prolapsus Uteri has biassed many observers as to the nature of this lesion, inasmuch as they have considered some change in the uterus as initiating the prolapsus. This is a natural error, and is perpetuated in most of our text-books by the writers of these considering prolapsus uteri under affections of the uterus. Prolapsus uteri is, however, considered here under Displacements of the Pelvic Floor, as it is really a hernial displacement of part of the pelvic floor in which the entire displaceable segment of the pelvic floor, uterus, and appendages are driven down by intra-abdominal pressure. There is no doubt that change takes place in the length of the uterus as the result of the downward displacement. This change is, however, a secondary one, as will presently be explained, and does not initiate the lesion.

The student must therefore use the term prolapsus uteri not in its literal sense, but as equivalent to "sacro-pubic hernia."

Prolapsus uteri is sometimes applied to hypertrophy of the vaginal portion of the cervix. This is wrong, as this hypertrophy is a growth phenomenon.

ETIOLOGY.

The factors producing prolapsus uteri are three in number:—(1) *Deficient support by entire fixed portion;* (2) *Deficient tone of entire displaceable segment of pelvic floor, and slackening of loose tissue round it;* (3) *Intra-abdominal pressure.*

Deficient support by entire fixed portion. By this is meant that through parturition the sacral segment has become straightened out or deficient at its lower margin—the perineum—and that the slope of the levatores ani has been lessened or that they have been torn (Schatz). It is wrong to imagine that tear of the perineum is everything in prolapsus uteri; the perineum may be considerably torn and yet, if the sacral segment is still sufficiently curved and the intra-abdominal pressure not too great, there will be no prolapsus. Tear of the perineum diminishes the sacral support, and deficient sacral and levator-ani support makes the task of intra-abdominal pressure easier.

The bearing of the *second* and *third* factors is sufficiently evident. Of all the three, increased intra-abdominal pressure is the most important and is sufficient to cause prolapsus in virgins. The first and second are adjuvant.

NATURE.

Prolapsus Uteri a Hernia.

The uterus has nothing to do with prolapsus. It is a classical term, but a misleading one. Prolapsus uteri is really *a hernia;* and is analogous in every point to what we term a surgical hernia (such as inguinal hernia).

Thus it has (1) a sac, the peritoneum; (2) a definite road to travel along, whose boundaries are—*a.* in front, the symphysis pubis, *b.* behind, the portion of the sacral segment of the pelvic floor from anterior wall of rectum back to sacrum, *c.* side walls, viz., obturator internus and levator ani muscles; (3) definite coverings, viz., *a.* pubic segment of pelvic floor, *b.* the uterus, *c.* posterior vaginal wall. Like all herniæ, its sac contains small intestine. (fig. 332)

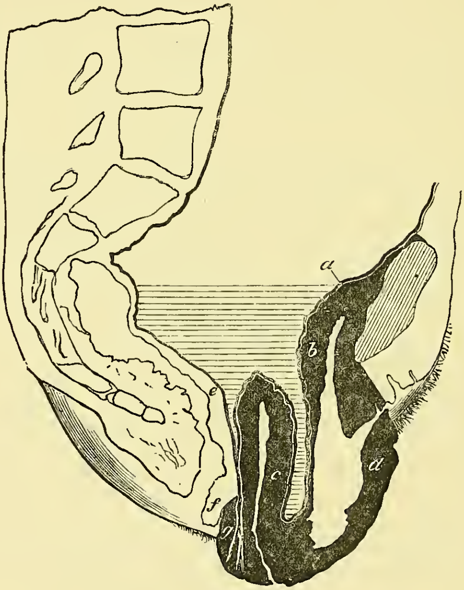

Fig. 332.

To show the Hernial Nature of Prolapsus Uteri; *a* peritoneum; *b* bladder; *c* uterus; *d* anterior vaginal wall; *e* anterior rectal wall; *f* perineum; *g* posterior vaginal wall. The dark portions are the coverings of the Hernia (after *Schütz*).

Huguier's Views.

Huguier alleged, wrongly we believe, that, by a hypertrophic elongation of the supra-vaginal portion of the cervix, the bladder and posterior vaginal wall were displaced downwards; and that many cases of alleged prolapsus uteri are really due to this. Such cases differed from prolapsus uteri in the fact that the fundus uteri and fundus of bladder are in position. Many gynecologists hold this view of Huguier, most of them modifying it somewhat. Schroeder's Handbook, Goodell's Gynecology, and Hart's Structural Anatomy may be consulted on this moot point.

SYMPTOMS AND PHYSICAL SIGNS.

The discomfort caused by the protrusion and the excoriation of the parts is the prominent symptom. The patient complains of "something coming down in front." Further, there is difficulty in micturition.

The physical signs are distinct. If the prolapsus be *incomplete*, a portion of the anterior vaginal wall has passed out at the vaginal orifice, the os uteri is equally displaced downwards, and the posterior fornix is apparently deeper from the descent of the cervix. The uterus, in addition to being low down, is usually enlarged; it lies with its axis coinciding with that part of the pelvic curve in which it is. If the prolapsus be *complete*, we find the whole anterior vaginal wall outside the vulva, the cervix extruded, and the posterior vaginal wall everted (fig. 176). The student must specially note that this description is based on *clinical* observation.

From the *study of frozen sections*, we further learn that the posterior vaginal and anterior rectal walls are separated by peritoneum driven in between them, and that the uterus with other parts has become hypertrophied through long-standing congestion, and the cervix elongated.

MECHANISM OF PROLAPSUS.

The displaced organs can be replaced—posterior vaginal wall first, then uterus, and lastly pubic segment; on the patient's straining, the mechanism of the displacement is repeated, is seen to be perfectly definite and to occur as follows.

Mechanism on Clinical Observations.

We have first the appearance of the anterior vaginal wall, from below upwards, at the orifice. *Pari passu* with its descent, the uterus and posterior vaginal wall have come down; the cervix tracing out the pelvic curve, while the uterus becomes more and more inclined backwards, until at the vaginal orifice it lies in the vaginal axis; the posterior vaginal wall forms a pouch, the depth of half its own length, behind it. Finally, the uterus is driven outside; the cervix sweeps upwards and forwards, and the posterior vaginal wall is now completely everted—its lowest part appearing last.

Appearance of Prolapsus on Section.

On vertical section, we now find these conditions:—(1) Almost complete extrusion of the anterior or pubic part of the floor, the upper and anterior part of the bladder still behind the symphysis; (2) Complete extrusion of the uterus, which sometimes lies with the fundus below the level of the anus; (3) Rectum in position and only posterior vaginal wall down; the latter has peeled from the rectum downwards as far as the lowest inch-and-a-half (of close connection) which is elongated (fig. 332).

Explanation of Mechanism.

The *explanation of this mechanism* is as follows. The displacement in prolapsus uteri is caused by intra-abdominal pressure, pushing down that part of the pelvic floor which lies in front of the anterior rectal wall, and inside the obturator internus and upper portion of the levator ani muscles. This part consists of entire displaceable portion of pelvic floor, with uterus and appendages. If we now look at a section of the pelvis such as is seen in Pl. I. (vertical mesial section) we find the posterior angle of the pubic segment is attached to the cervix uteri, and the cervix uteri to the top of the posterior vaginal wall. Thus, if intra-abdominal pressure is excessive, this part when driven down must have the following sequence of protrusion at the vaginal orifice: (*a*) Anterior vaginal wall from below up; (*b*) Cervix uteri; (*c*) Posterior vaginal wall from above downwards.

Our knowledge of the side relations in prolapsus is not yet known, but from the structure of the normal pelvis, we believe that separation takes place inside the obturator internus and upper portion of the levator ani muscles (*v.* Chap. IV.).

The uterus, while it is being forced down, has the *direction of its long axis* continually altering. This is often expressed by saying that the uterus becomes more and more retroverted, as it is forced down. The real fact is, that, as the pubic segment is forced down, it is stretched—chiefly on its peritoneal aspect. In this way tension is made on the cervix uteri, with the effect of throwing the fundus back and making it rest on the retrojacent structures. As these have (roughly speaking) the pelvic curve, we get the uterus in this way constantly altering the lie of its axis.

The *enlargement* is not purely cervical; but affects the whole uterus, the pubic segment, and the posterior vaginal wall. This enlargement is a *consequence* of prolapsus uteri, and not a factor in its production. If we view a prolapsed uterus (with the os at the ostium vaginæ) through the pelvic brim, it can be seen that it lies, as it were, at the bottom of a valley—the sides of the valley being the broad ligaments, the bed of the valley the uterus. The parts of the uterus do not lie on the same horizontal plane, the cervix lies low. It is thus probable that the venous supply of the uterus, having a mechanical disadvantage to its return, may have a tendency to stasis. This may lead to areolar hyperplasia at first, and, so far as our present knowledge goes, partly accounts for the increased size of the uterus in prolapsus. There is further probably a tensile elongation of the cervix produced which increases the uterine length.

SUMMARY OF DISPLACEMENT IN PROLAPSUS.

I. On clinical observation while a complete prolapsus is being reproduced, we note—

(*a*) The anterior vaginal wall from below upwards passing down and out at the vaginal orifice;
(*b*) The cervix uteri appearing at the vaginal orifice;
(*c*) The posterior vaginal wall, from above down, coming last.

II. If a frozen section of a cadaver with prolapsus uteri be examined (fig. 332), we note that the pubic segment, uterus and posterior vaginal wall are displaced down and out. Fig. 332 is based on Schütz's drawing of such a frozen section. Axial coronal sections have not as yet been published, but the ureters are displaced down along with the bladder, and by being pressed on by the pubic arch may give rise to uraemia, as in a case recorded by A. E. Barker of University College, London.

III. The combined study of I. and II. shows that

The bladder and uterus are displaced down, the vagina everted or turned inside out, the small intestine coincidently lowered in the pelvis, the displaced parts congested and hypertrophied, and the cervix uteri elongated secondarily.

DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS.

The diagnosis is made by noticing the relation of the parts extruded and by passing the sound if necessary into the bladder and uterus.

The differential diagnosis must be made from the following conditions:—

(1.) *Hypertrophy of the vaginal portion of the cervix;*
(2.) *Hypertrophy of the supra-vaginal portion of cervix.*

For both of these conditions the student is referred back to page 279 (see figs. 166, 174, 175).

(3.) *Cystocele.* Uterus is in position, and displacement is found to be due to bulging back of posterior wall of bladder.
(4.) *Rectocele.* The finger, passed through the anus, can be pushed into the pouched rectum.
(5.) *Inversion and polypus* (*v.* p. 392).

TREATMENT.

A. Treatment by pessaries,
B. Treatment by operation.

A. Treatment by pessaries. In slight cases, where the anterior vaginal wall protrudes only a little, we may use an Albert Smith or Hodge pessary, with or without transverse bars at the lower part. If this fails, a ring pessary with spring inside should be tried; this instrument is useful here, inasmuch as it is shorter vertically than the Albert Smith and therefore does not project over the lower end of the shortened posterior vaginal wall. The instrument may be made of vulcanite, block tin, or india-rubber. The india-rubber forms are best, and may be provided with a perforated diaphragm, but this tends to retain discharge.

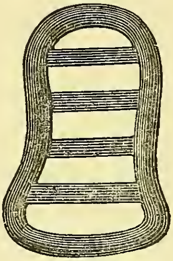

Fig. 333.
Greenhalgh's Pessary, with transverse bars.

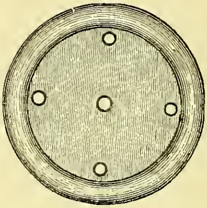

Fig. 334.
Ring Pessary, with diaphragm.

The pessary is taken in the right hand, and compressed between the finger and thumb as in fig. 335 while it is being passed through the vaginal orifice; the labia are separated with the fingers of the left hand.

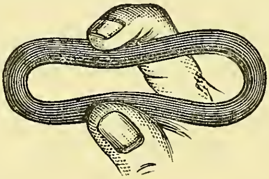

Fig. 335.
Simple Elastic Ring Pessary, compressed between the fingers for introduction (*De Sinéty*).

If the ring instrument fail, then others may be tried. Fig. 337 shows Zwanck's pessary, a bad form. A thin india-rubber bag distended with air and provided with a stop-cock is good. In very bad cases and in old women where an operation is out of the question, the patient or her friends should be instructed how to pack the vagina with marine lint; the packing, if thorough, may remain *in situ* for a week. Some recommend pessaries which are attached externally to an abdominal belt.

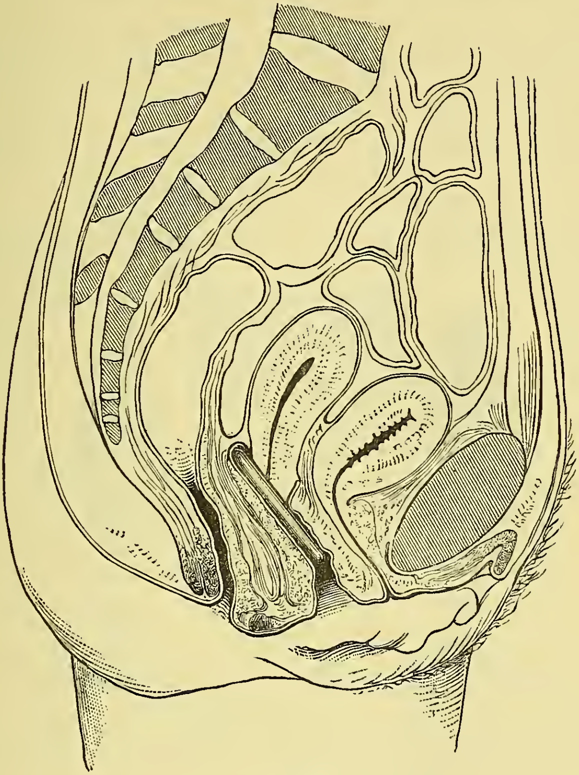

Fig. 336.
Ring Pessary *in situ* (*Hart*).

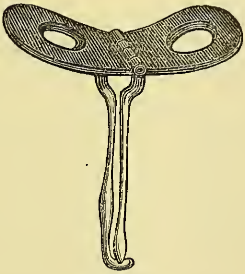

Fig. 337.
Zwanck's Pessary for Prolapsus.

When there is much congestion and excoriation, rest in bed with the use of alum injections (ʒi to Oi) and application of boracic or zinc ointments to the raw surfaces, are indicated.

If the patient has good abdominal development, an abdominal belt will be of use; when applied, it should be fairly tight at the lower edge and slack at the upper one.

B. Treatment by operation. We must first consider the *status quo* in an advanced prolapsus. There are the following primary and secondary lesions:—

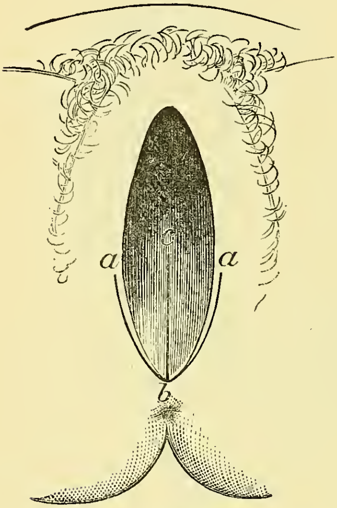

Fig. 338.
Lines of Incision in Operation for Repair of Ruptured Perineum. For letters see text.

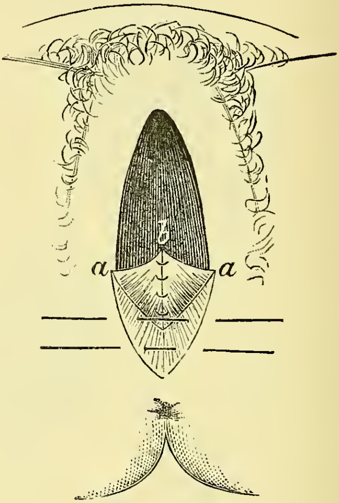

Fig. 339.
Sutures passed in same Operation.

Condition of Parts in Prolapsus Uteri.

Primary
(1) Perineal body usually torn and perineal union of levatores ani, transversi perinei, and bulbo-cavernosi, torn to a greater or less extent;
(2) Increase of intra-abdominal pressure;

Secondary
(3) Congestion with areolar hyperplasia of uterus, pubic segment, and posterior vaginal wall; laxity of everted vagina;
(4) Separation of anterior rectal and posterior vaginal walls and of vagina and bladder from their lateral relations, with peritoneum clothing the separated surfaces.

These secondary lesions, especially the last, are serious and incurable.

In order to restore the pelvic floor to its pristine state we should require (1) to repair the perineal body and narrow the vagina ; (2) to restrain increased abdominal pressure ; these are possible : (3) to do away with congestion and areolar hyperplasia is probably beyond our powers, while (4) to bring about adhesion of the anterior rectal and posterior vaginal walls and to restore the lateral supports is impossible. *Prolapsus uteri is therefore a condition with serious and irremediable secondary results.*

OPERATIVE TREATMENT OF PROLAPSUS UTERI.

For operative purposes we consider prolapsus uteri as a downward and outward displacement of the entire displaceable portion of the pelvic floor past the entire fixed portion, with eversion of the vaginal walls.

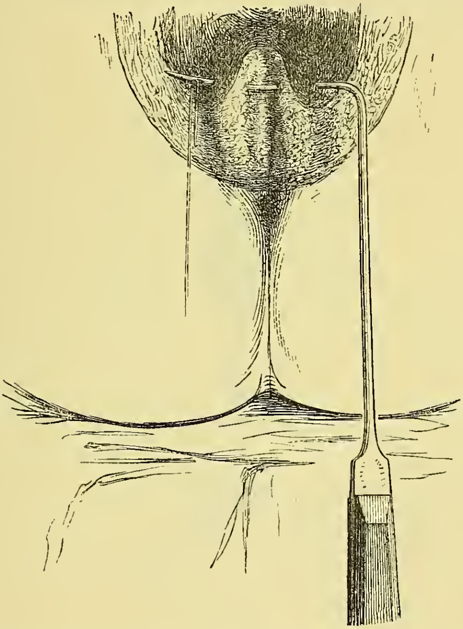

FIG. 340.

NEEDLE CARRYING IN STITCHES FOR REPAIR OF THE PERINEUM (*Sir J. Y. Simpson*).

The various operations may be classified as follows :—

1. Those that aim at giving a support to the prolapsed portions by repairing the lower edges of the sacral segment (Perineorraphy) and the lower uniting edges of the labia majora (Episioperineorraphy) ;

2. Those that aim at causing a narrowing of the vaginal walls or bringing about their partial union so that they are less easily everted (Elytrorraphy) ;

3. Those that combine 1 and 2;

4. The special operation which draws up the entire displaceable portion by shortening the round ligaments of the uterus (Alexander-Adams Operation).

Preliminary Considerations as to Operative Technique. It should be noted here that the method of rawing the surfaces has recently undergone a change. Formerly it was done with knife and forceps and the tissue removed: now scissors are often employed so as to raise flaps thus exposing a raw surface for union without loss of tissue.

Operations for Prolapsus.

1. *Those that aim at giving a support to the prolapsed portions by repairing the lower edges of the sacral segment and uniting the lower portions of the labia majora.*

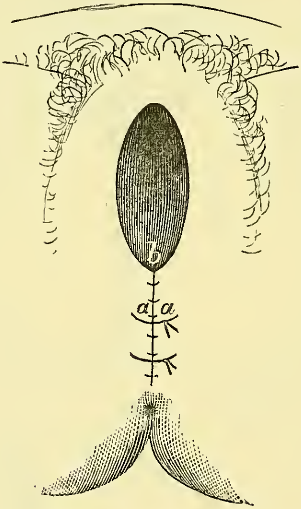

FIG. 341.
RESULT OF SAME OPERATION.

(1) *Perineorraphy.* This operation aims at restoring the perineal body, *i.e.*, it freshens and unites the torn surfaces. Perineorraphy alone is only of use as an operation in slight cases, inasmuch as the part restored lies mainly beyond the vaginal walls and therefore in no way hinders their eversion, although it may make the vulvar opening through which they pass somewhat narrower. We describe this operation briefly as it is always combined with union of the lower portions of the labia majora (Episioperineorraphy) or some operation causing cicatrization of the posterior vaginal walls (Elytroperineorraphy).

In the operation we chloroform patient, use douche and have knees held as described at page 559; make incision *b c* and *a b a* as in fig. 338;

dissect up flaps and pass stitches as in figs. 339, 340, 341. After treatment and removal of stitches as at page 561. As already said, this operation by itself is not of the remotest use unless it gets union of torn muscles, but it allows a pessary to be retained.

(2) *Episioperineorraphy.* In this operation the lower portions of the labia majora, as well as the cicatrized surfaces of perineal body, are vivified and the opposing raw surfaces united with silkworm gut sutures.

Lawson Tait operates with angled scissors as follows. He first notches the cicatrized surface mesially at the anterior portion of the perineum, the scissors being held parallel to the long axis of the patient's body. One blade is entered at right angles to this and pushed up in one labium majus to the base of the labium minus or beyond. The same is done on the opposite side. Thus a U-shaped incision is made. Silkworm catgut stitches are passed to unite each side as follows. A handled needle is used and the point entered inside the skin, say on the left side and out inside the mucous membrane of the same side. The needle is then withdrawn, and passed at a corresponding part on the right side, entering inside the skin and passing outside the mucous membrane, when the thread passed on the left

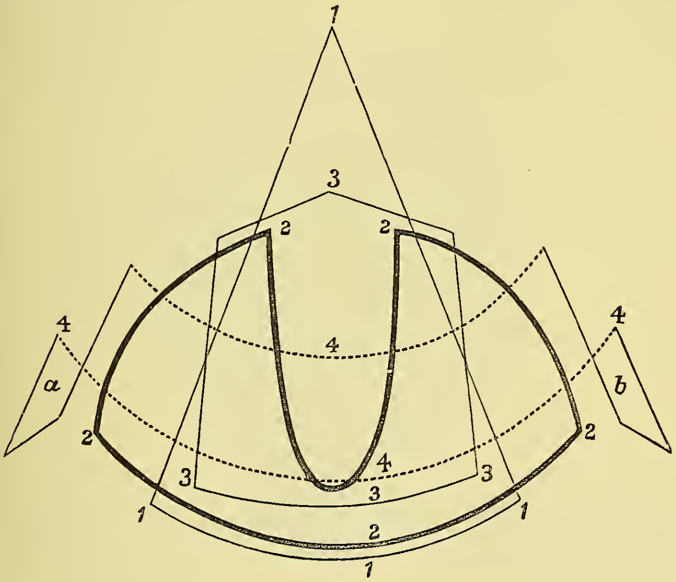

FIG. 342.

To show various forms of Raw Surface made on Posterior Vaginal Wall in Operation for Prolapsus Uteri: 1111, Hegar's; 2222, Bischoff's; 3333, Simon's; 444*ab* Winckel's. (*Winckel*) side is threaded into it and now drawn into the right side. This everts the raw surface on the one side and brings it into apposition with the correspondingly everted raw surface on the other side. Three or four sutures are thus passed and tied. The operation is quickly done but union may not be thorough or broad enough.

(3) *Elytroperineorraphy.* This is a favourite operation with many, and helps at least by enabling the patient to wear a ring pessary.

The patient is chloroformed, placed in the lithotomy position and the vaginal douche used.

The first thing to be done is to get a raw surface over the site of the perineal body and lower portion of posterior vaginal wall. The shape of this surface varies very much as may be seen at figs. 342 and 343.

Whichever is selected should be mapped out by a shallow incision; then the raw surface formed by dissection with the knife, by passing a double cutting knife below the mucous membrane, or with scissors. All that is wanted is a raw surface which should not be excavated, but as shallow as possible. Bleeding can be stopped by the hot douche, pressure forceps or catgut ligatures, if necessary.

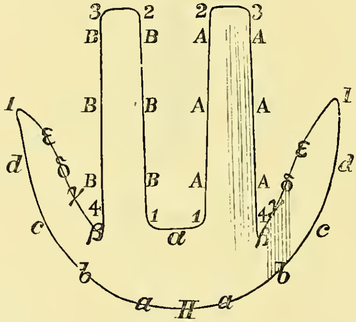

FIG. 343.

RAW SURFACE AS MADE BY MARTIN. 1 2 3 4, raw surfaces on posterior vaginal wall; II, raw surface round introitus. The surfaces 1-4 are united, A to A and B to B. The edge 4 β is turned in, with the corresponding one of opposite side, along the line a. The surface I II, is united by sutures, so that the English and Greek letters are in apposition respectively.

The passage of sutures is important. Silkworm gut is very good and may be used both for deep and superficial interrupted stitches. The deeper sutures are passed first and may go beyond the depth of the wound: then the superficial ones, beginning internally. All are passed before being tied.

The continuous spiral catgut suture is strongly recommended by many and is well worthy of trial (*v.* page 560).

2. *Those that aim at causing a narrowing of the vaginal walls or bringing about their partial union (Elytrorraphy).*

We may operate on the anterior vaginal wall only by Sims' method (fig. 344): or remove two strips on each wall and unite the opposing strips (Lefort, Neugebauer). This latter method may be used in complete prolapsus cases. The strips may be rawed by pinching up the necessary length with long-bladed forceps and cutting away what projects beyond the grip. Of course this is done with the parts extruded and then the opposing strips are united from above down with catgut and replaced as the thread is tightened.

Neugebauer removes a mesial portion from the vaginal walls, each part being about 4 cm. long by $1\frac{1}{2}-2$ cm. broad. These surfaces are then united to one another. The long axis of the raw surfaces may be vertical or transverse.

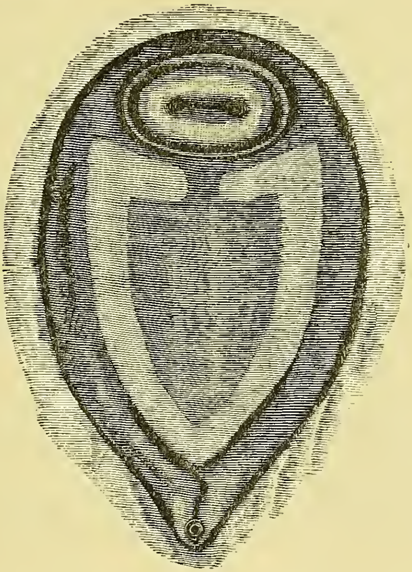

FIG. 344.
TO SHOW RAW SURFACE AS MADE BY SIMS (*Marion Sims*).

Each strip in Lefort's operation is 6 cm. by 2 cm.

3. It is evident that *we may combine* 1 *and* 2.

4. *The special operation which aims at drawing up the entire displaceable segment and uterus by shortening the round ligaments* (*Aran, Freund, Rivington, Alexander-Adams Operation*).

This operation, first performed in this country by Rivington of London and brought into prominence by Alexander of Liverpool and Adams of Glasgow, aims at shortening the round ligaments and fixing them in the inguinal canal so as to draw up and fix somewhat the displaced parts.

The bowels and bladder are emptied, the patient chloroformed and the pubes shaved. All antiseptic precautions are to be employed (Listerism). The pubic spine is felt for and an incision made up and out from it, two inches in length and in the line of the inguinal canal. The incision passes through skin and into the external abdominal ring, known by oblique fibres crossing it and protrusion of fat at its lower end. The tissue now bulging out from the ring (the end of the ligament) before entering the mons veneris, is lifted by an aneurism needle, grasped with the finger and pulled out gently, any bands preventing this being cut with the knife.

The other side is treated in the same way, both ligaments therefore being pulled out as far as possible.

The wound is then stitched, the sutures (catgut, silkworm gut or silver) being passed from side to side of incision, *i.e.*, through skin, pillar of abdominal ring, round ligament, pillar of ring, skin. The after treatment is based on general principles already laid down.

Care is to be taken at first when the patient moves about, and a ring or other suitable pessary used if necessary.

Sufficient is not yet known about the results of this operation,[1] and from what is known it is falling into disfavour. Deaths have been recorded from it. One evident objection is the risk of inguinal hernia.

We may finally note that in advanced prolapsus uteri the uterus has been excised; and Müller of Bern has performed abdominal section, drawn up the uterus, clamped it at the isthmus, removed the body of the uterus and treated the pedicle extra-peritoneally. Neither of these proceedings is at all to be recommended.

We recommend in treatment

(1) Use of a ring in slight cases;
(2) Episioperineorraphy or Elytrorraphy anterior and posterior, and a pessary in medium cases;
(3) Lefort's or Neugebauer's method in advanced cases.

The use of massage in prolapsus uteri will be described in the Appendix.

VAGINAL ENTEROCELE.

Of this there are two forms, *anterior* and *posterior*. Excessive intra-abdominal pressure usually displaces all of the pelvic floor that lies in front of the anterior rectal wall. Occasionally, but very rarely, intestine is forced down between the posterior aspect of the bladder and upper part of anterior vaginal wall, or between the anterior rectal and posterior vaginal walls (fig. 345). We thus get a mass bulging into the vagina, but affecting only one wall; the uterus and cervix remain in position. This distinguishes it from prolapsus uteri and cervical elongation; by rectal examination, the posterior form of *enterocele* can be easily distinguished from rectocele.

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[1] For recorded cases, see Index of Gynecological Literature under "Miscellaneous."

The *causation* is not well known. In the posterior form, a deep dip of the peritoneum behind the posterior vaginal wall may have existed; but of this there is no evidence.

Treatment. If any ordinary Albert Smith or anteversion pessary fail, an operation may be tried. In the posterior vaginal enterocele, for example, the protrusion should be replaced; a raw surface is then made on the posterior lip of the cervix and a portion of the posterior vaginal wall about its middle; these surfaces are then stitched.

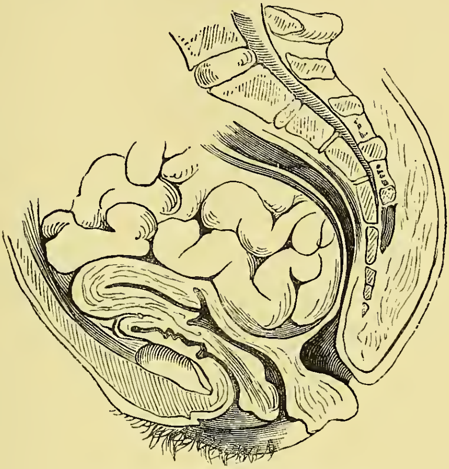

FIG. 345.
POSTERIOR VAGINAL ENTEROCELE Breisky).

Prolapsus uteri and both forms of vaginal enterocele are therefore essentially the same in nature, viz., hernial. Intra-abdominal pressure usually displaces all in front of the anterior rectal wall; but may also force intestine in front of the anterior vaginal wall, or behind the posterior one.

SECTION VIII.

DISTURBANCES OF THE MENSTRUAL FUNCTION.

CHAPTER L. Amenorrhœa: Menorrhagia: Dysmenorrhœa.

SECTION IX.

DISTURBANCE OF THE REPRODUCTIVE FUNCTION.

CHAPTER LI. Sterility.

CHAPTER L.

AMENORRHŒA: MENORRHAGIA: DYSMENORRHŒA.

The three subjects to which this section is devoted are not diseases, but are symptoms of a large number of the more or less well-ascertained pathological conditions already considered. Theoretically, therefore, they should not come up for special consideration; practically, however, it is of use to the practitioner to summarize the conditions causing these symptoms, and to give some special hints as to their treatment.

AMENORRHŒA.

(*For recent Literature, see Index.*)

This means cessation of menstruation during the period between puberty and the menopause. It is normal to have Amenorrhœa during pregnancy and lactation. Amenorrhœa may be caused by the following *Local* conditions:—

Causes.

Congenital	Absence or incomplete development of uterus and annexa, atresia of the genital canal (with or without accumulation of the menstrual blood), state of cretinism;
Acquired	Superinvolution, simple atrophy of uterus, cystic ovarian disease, extensive inflammatory conditions of uterus and ovaries.

Constitutional conditions—such as phthisis, chlorosis, prematurity of menopause—also cause amenorrhœa.

The local conditions have already been fully described under the various heads; we give here only a few hints as to the investigation of the causes of this symptom. When the patient complains of *never having menstruated* and there is no constitutional cause for the amenorrhœa, the question of examination should always be entertained; abdominal palpation and rectal examination are employed to ascertain that there is no retention from atresia. To ascertain the condition of the uterus, a vaginal examination may be necessary. *Sudden cessation* of the menstruation in a women neither phthisical nor chlorotic is usually due to pregnancy; early sickness, mammary and other signs should be looked for. Nothing is a sure sign of pregnancy except the characteristic increase in the size of the uterus, agreeing with the number of periods passed.

Treatment.

In cases where amenorrhœa is due to chlorosis, Blaud's pills are indicated. These contain sulphate of iron and carbonate of potash made up as undernoted; as the result of the combination, the carbonate of iron is formed.

℞	Ferri sulphatis.	
	Potassii[1] carbonatis	āā gr. iiss.
	Mucilaginis tragacanthæ	q.s.

Fiat pilula: mitte tales 96.
Sig. Three, thrice daily.

Nine pills must be taken per diem continuously for six to eight weeks, by which time a complete cure usually results.

Before the pills are given, the state of the tongue and bowels should be looked to. If the tongue is foul and the bowels constipated, we may give the following:—

℞	Magnesii sulphatis	℥i.
	Quininæ[1] sulphatis	gr. xxiv.
	Acidi sulphurici dil.	ʒiij.
	Aquam ad	℥vi.

Sig. Tablespoonful twice or thrice daily.

This is taken for a week. The Carlsbad salts or Friedrichshall water may be substituted. This hint as to the preliminary purgation is a good one, and is given by Milner Fothergill; if not attended to, the result will be disappointing as the iron will not be so readily absorbed by the intestinal mucous membranes.

Note. The original composition of Blaud's pills is as follows:—Sulphate of iron, carbonate of potash, of each half-an-ounce; marshmallow root thirty grains; gum tragacanth q.s. to make 120 pills.

The following are the proportions in the pill as made by Messrs Duncan, Flockhart, & Co. of this city: Ferri sulph. siccat. 15, Potass. carb. siccat. 15, Pulv. gum. acaciæ 3, Syrup. simp. 9; Divide in 5-gr. pil.

Blaud's pill gives a ferrous carbonate and a potash salt, the decomposition taking place after the pill is swallowed.

In Vallet's pill, which is popular on the continent, the decomposition is effected first and the carbonate of iron thus freshly formed is used to make the pill. The quantities taken to make Vallet's pill are as follows:—Protosulphate of iron (in crystals) 10, Carbonate of soda (in crystals) 12, White honey 3, Sugar of milk 3; Divide in 5-gr. pil.

Ringer recommends permanganate of potash. The following is a good formula:

℞	Potassii Permanganatis.	
	Kaolin āā	gr. ij.
	Vaselini	q.s.

Fiat pilula: mitte tales xxiv.
Sig. One thrice daily.

---

[1] According to the terminology of the new pharmacopœia.

These pills should not be made with any excipient containing glycerine or with an oxidizable substance as their union would cause combustion.

Oxide of manganese (manganesii oxidum præparatum) in two grain doses thrice daily is also excellent.

MENORRHAGIA.

Menorrhagia is the term applied to excessive hæmorrhage at the menstrual periods; when the hæmorrhage is intermenstrual, it is termed metrorrhagia.

Causes.

The causes of menorrhagia are the following:—

Constitutional	Hæmorrhagic diathesis, scorbutic conditions, alcoholism;
Local	Ovaritis, small cystic ovaries, endometritis, metritis, subinvolution, retroversion of uterus, inversion of uterus, submucous and interstitial fibroids, polypi, carcinoma uteri, sarcoma uteri, incomplete abortion.

It should not be forgotten that we may have menorrhagia in cardiac disease, and also in hepatic congestion (*Matthews Duncan*, *Warner*).

Women who are drunkards very often suffer from menorrhagia owing to the liver congestion. This may give the practitioner a hint as to the patient's habits, especially as those women who drink always conceal the failing, and often most successfully. When called to such, there is usually found great epigastric pain on pressure, tremulous tongue, and depression of spirits, for which their excuse is quite inadequate.

Treatment.

The treatment of menorrhagia is the treatment of the condition producing it. In cardiac disease we give digitalis; and in hepatic disease we may try chloride of ammonium, euonymium or iridin.

℞	Ammonii chloridi	ʒiij.
	Aquæ	℥vj.
	Sig. Tablespoonful thrice daily.	

℞	Euonymii vel	
	Iridin	gr. ii.
	Pil. aloes et ferri	q.s.
	Fiat pilula: mitte tales xij.	
	Sig. One at night.	

In cases where there is menorrhagia due to a simple congested condition or to a flabby state of the uterine muscle, we may give the following at the menstrual periods:—

℞	Ergotinæ	gr. iv.
	Argenti oxidi	gr. $\frac{1}{4}$
	Micae panis	q.s.

Fiat pilula: mitte tales xij.
Sig. One thrice daily as directed.

Note that it is well not to write "at the menstrual period" on the prescription, but to put "as directed." When the practitioner is consulted as to menorrhagia in unmarried women or young girls, he should first try the ergotin and oxide of silver pill. If this fail and the case be urgent, he should request a local examination. If this be declined, the responsibility rests with the patient.

℞	Extracti ergotæ liquidi	℥ij.

Sig. Thirty drops as directed

or

℞	Ergotini	gr. iv.

Fiat suppositorium: mitte tales xij.
Sig. As directed.

Inform the patient that two suppositories are to be passed into the rectum each morning after the bowels move.

In some cases the hypodermic injection is required (*v.* p. 426).

DYSMENORRHŒA.

LITERATURE. *Duncan, Matthews*—Clinical Lectures: London, 1886, p. 141. *Goodell*—Lessons in Gynecology: Philadelphia, 1879. *Gusserow*—Menstruation and Dysmenorrhœa: Germ. Clin. Lect., New Syd. Soc. Tr., 1877. *Herman, G. E.*—On the Relation between Backward Displacements of the Uterus and Painful Menstruation: Lond. Obst. Trans., 1882. *Solowieff*—Decidua menstrualis: Archiv f. Gyn., Bd. II., S. 66. *Schroeder*—Die Krankheiten der weiblichen Geschlechtsorgane: Leipzig, 1887. *Simpson, Sir J. Y.*—Diseases of Women, p. 225: Edin., 1872. *Williams, John*—Pathology and Treatment of Membranous Dysmenorrhœa: Lond. Obst. Tr., 1877. See also Index of Recent Literature in the Appendix.

Dysmenorrhœa may be defined as the occurrence of pain before, during, or after the menstrual period.

The pain of dysmenorrhœa varies greatly in intensity. It may be so severe as to render the sufferer a miserable invalid, it may interfere with her work more or less, or it may cause only marked uneasiness. It is always advisable in cases of dysmenorrhœa to ascertain how much the pain interferes with the patient's occupation or whether it confines her to bed. Note also when the pain occurs—prior to, during, or after the blood-flow; in the purely spasmodic form, it is during the flow.

In order to treat dysmenorrhœa intelligently, we must endeavour to ascertain its cause and try to make out how this condition brings about the pain. We know nothing at all as to the real cause of dysmenorrhœa. We know that in many instances it is associated with certain pathological conditions, but how these actually cause the pain is as yet disputed.

Some facts as to menstruation help us in understanding dysmenorrhœa. The uterus is an erectile organ (p. 71), and as the decidua menstrualis is five or six times thicker than the uterine mucous membrane, it is evident that metritis or pathological anteflexion when present will hinder the erection and expansion of the uterus, and cause intense pain analogous to the chordee of the penis in gonorrhœa.

In normal menstruation, a fluid made up of blood and epithelial debris escapes from the uterus. Probably, it does not drain away by mere capillary action but is expelled by uterine contractions. There is no absolute proof of this, but it is a fair deduction from anatomical facts. If a patient be examined while menstruating, we may feel an arching or slight tension of the fornices indicative probably of uterine action.

Dysmenorrhœa is usually divided into certain forms. It is to be regretted that this has been done, because there have not been collected pathological facts sufficient to warrant a classification. The forms usually given are the following:—

Forms usually given.

1. Dysmenorrhœa associated with certain diatheses, such as the gouty and rheumatic;
2. Spasmodic dysmenorrhœa;
3. Membranous dysmenorrhœa;
4. Dysmenorrhœa associated with inflammatory conditions of the uterus, ovary, peritoneum or cellular tissue;
5. Ovarian dysmenorrhœa.

The last term is applied to certain cases which were supposed to be specially connected with the ovaries and which could not be classified under the preceding heads. The term is a most unfortunate one. It assumes a cause for dysmenorrhœa which is not, as yet, demonstrated; and, instead of pathological facts or a confession of our ignorance of them, gives us what we have too much of already—erroneous terminology.

Practical Varieties.

So far as our present knowledge goes we can speak of four varieties:—

1. Spasmodic dysmenorrhœa;
2. Congestive dysmenorrhœa;
3. Membranous dysmenorrhœa;
4. Dysmenorrhœa associated with mal-development of the sexual organs, pyosalpinx, fibroma uteri, rheumatic diathesis, and some other unknown causes.

The Erection and Expansion of the Uterus hindered.

1 and 2. *Spasmodic and Congestive dysmenorrhœa.* Of these the most frequent cause is pathological anteflexion, *i.e.*, anteflexion of the uterus produced by inflammation in the utero-sacral ligaments with cicatrisation. The pathology, diagnosis and treatment of this affection is given at pp. 347-356. We only remark here that it is a very serious lesion owing to its inflammatory etiology. From the flexion produced, we get spasmodic uterine contraction accompanied with very great pain and expulsion of clots. Two theories of dysmenorrhœa have been already explained (p. 351). Those who hold the purely mechanical theory seem to forget that fluid blood passes easily through a capillary. Does any one believe that the lumen at the flexion is less than that of a capillary?

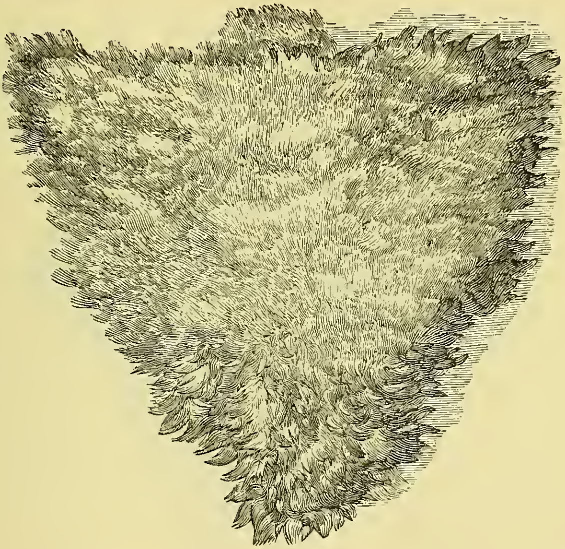

FIG. 346.
SKETCH OF A DYSMENORRHŒAL MEMBRANE AS SEEN UNDER WATER (*Sir J. Y. Simpson*).

Spasmodic contraction of the os internum and constriction of the cervical canal are also advanced as causes.

Membranous Dysmenorrhœa.

3. *Membranous dysmenorrhœa.* In this condition, the superficial layer of the mucous membrane is cast off as a triangular sac or in shreds of a more or less firm consistence (figs. 346, 347). This may result from the occurrence of hæmorrhage in the deeper layers of the mucous membrane; and then we can understand that, according to the depth, we have present no part of the glands or only their cœcal extremities (*Solowieff and Gusserow*). Microscopically, there is excess of round cells and fibrillated tissue in the membrane.

J. Williams, who has written ably on this subject, believes that, owing to an excess of fibrous tissue in the walls of the uterus, the mucous membrane is expelled in coherent shreds. This excess of fibrous tissue is due to defective evolution, sub-involution, or metritis. The membrane is, further, never a plastic exudation. *It is of the greatest importance to remember that it is not a product of conception and should not be mistaken for an early abortion.*

4. *Dysmenorrhœa from other causes, as defective development of uterus, pyosalpinx*, etc. Many of these conditions are now being elucidated by abdominal section undertaken for Battey's and for Tait's operation.

TREATMENT.

Cautions as to Treatment.

At the outset we are met with a difficulty. As we are usually consulted for Dysmenorrhœa in unmarried women, the question of the propriety of a pelvic examination comes up. As Duncan has said—"No rules that I can give you will make up for want of good sense and good feeling on your own part, but I shall give you some hints. The first is that you should, as a rule, not resort to this treatment (by bougies) in an unmarried young woman without the concurrence of three parties—firstly, your own approval; secondly, that of the mother or guardian of the patient; and, thirdly, that of the patient herself. All of these should be quite aware of the circumstances, and of what it is proposed to do."

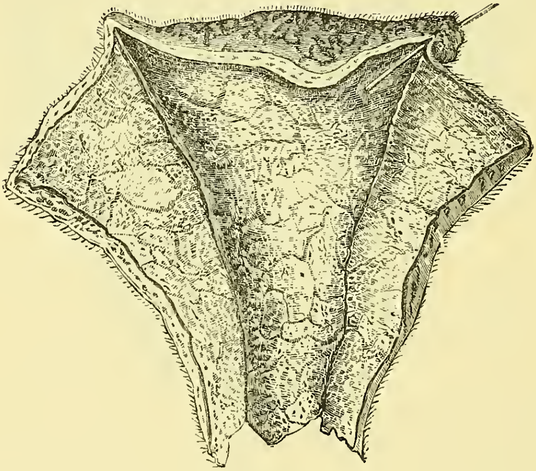

Fig. 347.
A Dysmenorrhœal Membrane laid open (*Coste*).

Nothing can be more reprehensible than the vaginal examination of unmarried women for trifling ailments. When the Dysmenorrhœa is slight, make no examination but order some such mixture as the following.

℞ Spiritus chloroformi,
Spiritus ammoniæ aromatici, āā ℥ss.
Liquoris ammoniæ acetatis ℥i.
Sig. Teaspoonful in a wine-glassful of hot water occasionally.

Order a hot hip bath, or the feet to be put in mustard and water. On no account whatsoever allow alcohol in any form to be given. If the mother has been giving whisky and water or gin and water, at once point out the risk the patient is running. Do not give morphina, or other opiate, unless driven to it; always give it yourself and hypodermically, never by the mouth or rectum, and give no prescription for it.

When the Dysmenorrhœa is urgent, then an examination should be advised; the index finger well oiled can usually pass in without much pain.

If pathological anteflexion is found, note the amount of inflammatory disturbance, the degree of flexion, and the implication or non-implication of the tubes and ovaries. Begin by ordering blisters to the iliac regions, bromide of potassium, the glycerine plug, and the hot vaginal douche. See that the bowels are regulated, and soft motions secured by the use of liquorice powder (Pulv. glycyrrhizæ co.) and occasional enemata, and that no tight lacing is allowed. Chlorotic patients should be put on Blaud's pills and digitalis, and change of air, when requisite, ordered. Note the effect of this for some periods; and then, if unrelieved, pass the sound or graduated bougies or use uterine dilator. This course benefits the Dysmenorrhœa, and it is safer than the use of stem pessaries; the dilatation by bougies seems to act like the stretching of the sphincter ani in fissure of the anus and often gives brilliant results.

Patients with neurasthenia often suffer severely at the menstrual periods. Local treatment is contra-indicated, as the dysmenorrhœa often passes off while the general condition is improving.

If the Dysmenorrhœa is membranous, treatment is of little service. The following prescriptions may be tried.

℞ Liquoris arsenicalis ʒij.
Sig. Three drops in water thrice daily after food.

℞ Liquoris arsenii et hydrargyri iodidi (Donovan's solution) ʒij.
Sig. Five drops in water thrice daily after food.

The action may be analogous to that of arsenic in psoriasis.

Treat any endocervicitis or stenosis of cervix present. The prognosis is unfavourable as to cure. The patients are not necessarily sterile.

In the third class of cases, Battey's operation has not given the results anticipated. We have not as yet, however, facts warranting any dogmatic utterance. Where the ovaries are developed but not the uterus, with serious menstrual molimina resulting in consequence, Battey's operation is undoubtedly indicated. In cases of pyosalpinx, removal of tubes and ovaries by abdominal section gives good results (*v.* p. 212).

Where any diathesis (rheumatic or gouty) is supposed to influence the Dysmenorrhœa, guaiac, colchicum and such specific drugs may be given.

CHAPTER LI.

STERILITY.

LITERATURE.

Duncan, J. Matthews—Fecundity, Fertility, Sterility and allied topics: Edinburgh, A. & C. Black, 1866. On Sterility in Women: J. & A. Churchill, 1884. *v. Grünewaldt*—Ueber die Sterilität geschlechtskranker Frauen: Archiv f. Gyn., Bd. VIII., S. 414. *Kehrer*—Zur Sterilitätslehre: Beiträge zur klinischen und experimentellen Geburtskunde und Gynäkologie, Bd. II., S. 76. *Müller*—Die Sterilität der Ehe: Billroth u. Luecke's Handbuch der Frauenkrankheiten: Stuttgart, 1885, S. 297. *Sims, Marion*—Uterine Surgery: London, 1865. *Simpson, Sir J. Y.*—Obstetrics: Edin., A. & C. Black, 1871, p. 830. *Whitehead*—On the causes and treatment of abortion and sterility: London, 1847. See also Index of Recent Literature in the Appendix.

The reproductive function is the most complex and subtle of all the functions of life. If we know little about the simpler function of menstruation so that there is room for great difference of opinion with regard to it, we know still less of the function of reproduction. Of its physiology, we know only that it requires the presence of ova and spermatozoa; of the constitutional influences affecting the vitality of these two and the conditions favourable for their conjugation, even of the place where this occurs, nothing is known. Nor have we yet data for studying the general laws of fertility for the human female. Much has been done by Darwin and others to elucidate these for plants; little is known of them for animals, and almost nothing for the human species.

Of the disturbances of the reproductive function, sterility belongs to Gynecology; abortion, retroflexion of the gravid uterus and extra-uterine gestation belong more properly to Obstetrics.

Distinction between Absolute and Relative Sterility.

No simple and yet complete definition of sterility can be given. The word has a quite different meaning as we use it relatively or absolutely. As the opposite of fertility, it includes cases in which a child is not born till many years after marriage or the number of children is comparatively few; further, inasmuch as the reproductive function covers gestation as well as the birth of a viable child, sterility includes all cases of intra-uterine disease and death of the embryo or fœtus, resulting in abortion, premature labour, or the birth of a non-viable child. None of these cases are absolutely sterile, the sterility *is relative.* The term also necessarily covers all cases in which under circumstances favourable to conception, this either has not occurred at all or the product has not gone the length of even an early abortion. Here the sterility is *absolute.* This raises the question as to when sterility is relative, and when absolute. What is the standard of fertility by which we decide that a woman is relatively sterile and measure the degree of that sterility? When can we say that a patient is absolutely sterile?

Relative Sterility.

Relative Sterility. At first sight, we should be inclined to regard the period of child-bearing as co-extensive with the period of menstruation. But it is not so. The period of fertility is not co-terminous with the period of menstrual activity: it begins later and ends earlier, its total duration being about fifteen years, during which time births take place about every eighteen or twenty months. Its commencement is determined by the year of marriage, in this country on an average the twenty-fifth year, the first child being born in most cases twenty months after marriage. It ceases usually about thirty-eight, some years before the menopause. Thus, as Whitehead puts it, there is a period of quiescence in the function of reproduction both at the commencement and at the termination of menstruation. (*Matthews Duncan*)

Taking the foregoing considerations as giving us a standard of fertility, we learn that relative sterility may show itself in such various ways as these,—not having the first child within twenty months after marriage, having children at intervals of longer than twenty months, ceasing to have children within fifteen years after marriage. In applying these considerations to an individual case, however, we must of course take into account the age of the patient. There seems also to be great variation in the productive power of different individuals. One patient has many children without injury to health, while in another the birth of one child exhausts the reproductive function. Sir James Simpson found that among British peers unproductive marriages are relatively more common (1 in 6, instead of 1 in 10). As the result of relative sterility we find that the number of children to a marriage in Britain is 5·2 or one-half of what it would be if all the conditions favourable to reproduction were fulfilled.

Absolute Sterility.

Absolute Sterility. The interval between marriage and the birth of the first child averages twenty months, and any protraction of this interval means a degree of sterility; but we cannot speak of absolute sterility until several years of married life have passed without even an abortion. Matthews Duncan found in his statistics of the births in Edinburgh and Glasgow for the year 1855, an average interval of 17 months to the first child—two-thirds being born before the end of the second year, and only one-twenty-fourth after the fourth year. Hence, he concludes that there is no ground for the assumption of persistent sterility until the fourth year of married life has been entered upon.

Of the number of absolutely sterile marriages in Britain we have no data. The statistics of Sir J. Y. Simpson, based on the reports of the population of Grangemouth and Bathgate which give the number of sterile marriages as 1 in 10, include abortions and all other cases in which a child would not be registered, so that they cannot be relied upon for data regarding absolute sterility.

Etiology of Sterility.

The *Etiology* of Sterility is too wide a subject to be exhaustively discussed here. We can only indicate what the causes are and point out the necessity of taking a broad view of this question.

Amongst *general influences*, we note first of all the effect of *temperature* and *climate*, and of marriage between *near relatives*. Under *want of sexual agreement* have been placed many cases which have not been explained otherwise (such as the classical one of Napoleon and Josephine). *Age* has an undoubted influence; the period of nubility is from the age of twenty to twenty-five, and marriages before or after this period are less fertile. The influence of *disturbed nutrition* is seen in the association of sterility with obesity; it seems that the taking-on of fat is at the expense of the reproductive function, perhaps through interference with ovulation. *Chlorotic* patients are also sometimes sterile. The association of *Dysmenorrhœa* with sterility has been already referred to (pp. 267 and 352) and is a matter of everyday observation. Matthews Duncan found spasmodic dysmenorrhœa in 47·9 (159 out of 332) of his cases of sterility; while Marion Sims found it in 51·6 p.c. (129 out of 250) of his. Further, these conditions disappear together under treatment, and spasmodic dysmenorrhœa is a rare condition in fertile women.

As to *local causes*, we note that sterility is found associated with the following conditions already described:—vaginismus, p. 530; hypertrophied cervix, p. 280; conical cervix with pin-hole os, p. 265; cervical catarrh, p. 308; anteflexion, p. 350; retroflexion (more rarely), p. 366; endometritis, p. 323; ovaritis, p. 203; pelvic peritonitis, p. 162. The last three are probably the most important. Taking the function of reproduction instead of the various organs as the standpoint from which to regard sterility, we find that this function may be divided into three processes—Insemination, Impregnation of the ovum or Conception, and Gestation. A certain number of cases of sterility are due to defect in *Insemination* (*e.g.* all cases of Dyspareunia); but the most important group of cases coming under this head are those of absence or deficient vitality of the Spermatozoa. As we are dealing here only with sterility in the female, this last cause of sterility is beyond our subject; but it is important to remember that Gross's investigations into male sterility show that it is probably the cause in every sixth case which comes before us. As to the relative importance of *Conception* and *Gestation*, the investigations of v. Grünewaldt show that interference with the latter is a much more important factor in sterility than is generally supposed. Investigating 500 cases of sterility from the standpoint of the influence that the condition of the uterine tissue has on gestation, he comes to the following conclusion:—Conception forms only one link in the chain of processes involved in the fertility of marriage, and is of slight importance compared with the great number of vital processes implied in gestation; the point of greatest importance in the fertility of woman is her capability of carrying a fertilised ovum, which depends to a great extent on the integrity of the uterine tissue.

Kleinwächter[1] met with one-child sterility in 8·32 p.c. of his cases. The age at which the women married seemed to have nothing to do with it. He finds that the causes are the same as in the case of absolute sterility (apart from congenital malformations), viz.:—

Inflammation after puerperium,	17·77 p.c.
,, not ,, ,,	12·22 ,,
Endometritis,	17·77 ,,
Uterine displacements,	12·22 ,,
,, neoplasms,	8·88 ,,
Constitutional conditions,	7·77 ,,
Male impotence,	7·77 ,,
Uterine atrophy,	5·55 ,,
Ovarian neoplasms,	3·33 ,,
Unknown causes,	6·66 ,,

Treatment. In the *treatment* of sterility, we must take a broad view of the etiology and not allow local conditions to influence us unduly. Attention to the general health, and patient waiting until at least three years of married life have passed is all that is required in the large proportion of cases. Entire cessation of intercourse for several months should be recommended, and can be secured by change of air to some watering-place at home or abroad, according to the patient's means. Where coitus is impossible or painful (as in cases of atresia and vaginismus) operative interference is called for immediately, and such cases offer the most satisfactory results in treatment (see p. 520). In estimating the importance of operations on the cervix (p. 269), we must keep in view the rarity of this indication for treatment and the uncertainty that an operation by dilatation or division will be beneficial. Whether the sterility be due to the rigid condition of the cervix or the smallness of the os externum, such cases form only 4 p.c. (*Müller*) or 8 p.c. (*Kehrer*) of the total number of women who seek advice for sterility. In other words, taking Müller's statistics the chances are 24 to 1 that the cause of sterility must be sought elsewhere than in the cervix.

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[1] *Centralb. f. Gyn.*, XII., 287.

SECTION X.

AFFECTIONS OF BLADDER AND RECTUM.

Chapter LII. The Bladder: Anatomy, Physiology, and Methods of Examination.
" LIII. Affections of the Urethra and Bladder.
" LIV. Vesico-Vaginal Fistula.
" LV. The Rectum: Coccygodynia.

APPENDIX.

Abdominal Section.
Electricity in Gynecology.
Systematic Treatment of Nerve Prostration.
Hysteria and Hystero-Epilepsy.
Massage.
Relation of Gonorrhœa to Gynecology.
Case-Taking.
Sources of Gynecological Literature.

INDEX OF RECENT GYNECOLOGICAL LITERATURE.

CHAPTER LII.

THE BLADDER: ANATOMY, PHYSIOLOGY AND METHODS OF EXAMINATION.

LITERATURE.

Burckhardt—Endoskopie und endoskopische Therapie: Tübingen, Laupp'schen Buchhandlung. *Chiene*—Bladder Drainage: Ed. Med. Jour., 1880. *Croom, J. H.*—On Retention of Urine in the Female: Ed. Med. Jour., April and May 1878. *Fenwick, E. H.*—The Electric Illumination of the Bladder and Urethra: London, Churchill, 1888. *Foulis*—An Antiseptic Catheter for washing out the Bladder: Brit. Med. Jour., Jany. 30, 1886. *Hart*—Physics of Rectum and Bladder: Ed. Obst. Trans., 1882. *Nitze*—Lehrbuch der Kystoskopie: Wiesbaden, 1889. *Noeggerath*—The Vesico-vaginal and Vesico-rectal Touch: Am. J. of Obstet., viii., 135. *Ogston*—Ed. Med. Jour., 1878. *Pawlik*—Ueber die Harnleitersondirung beim Weibe: Archiv f. klinische Chirurgie, Bd. XXXVI., Hft. 2. *Power*—Physiology of Micturition: The Practitioner, 1875. *Sänger*—Ueber Tastung der Harnleiter beim Weibe: Archiv f. Gyn., Bd. XXVIII., S. 54. *Skene*—Diseases of the Bladder and Urethra in Women: W. Wood & Co., New York, 1878. *Winckel*—Die Krankheiten der weiblichen Harnröhre und Blase: Billroth's Handbuch, Stuttgart, 1886.

Diseases of the bladder are of the greatest importance as they are not only very painful, but, for a reason to be given shortly, very intractable. In a Manual of the present scope, a full consideration of vesical disease is impossible; we therefore give a mere sketch, and refer the practitioner for details to Skene's or to Winckel's Manual.

ANATOMY AND PHYSIOLOGY.

Physiology of Urination.

For the anatomy, the student is referred to pp. 30 to 35. We should here only point out that the female bladder, owing to its greater breadth transversely at the base (*v.* fig. 359), is relatively more capacious than that of the male.

Urination. The mechanism of the storage and expulsion of urine from the bladder is full of interest, both from a theoretical and a practical point of view. The urine trickles along the ureters, a result partly due to blood pressure and partly to the peristaltic action of the ureters themselves. It thus reaches the bladder, at this stage an empty flaccid sac with its upper half fitting into the lower calyx-like portion. Gradually the bladder distends, until at last the activity of the motor centre (whose constant action keeps the urethral muscles contracted) is reflexly inhibited, and the urine is expelled by the muscular contraction of the bladder and intra-abdominal pressure. The bladder is now contracted and, on section, has the shape seen at fig. 348—its shape in systole. The bladder then relaxes, *i.e.*, becomes flaccid—its diastole, and once more the urine trickles into it (fig. 25).

The bladder therefore has, like the heart, its systole and diastole. A knowledge of this is important practically. It explains the intractability of inflammatory conditions of the bladder, since the bladder when inflamed does not get—what every inflamed organ requires—rest.

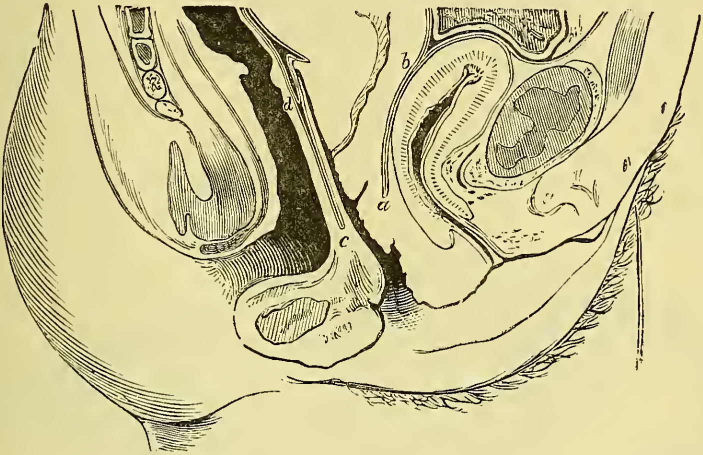

Fig. 348.
Bladder in Systole (*Braune*).

Composition of Urine.

The average amounts of the several urinary constituents passed in twenty-four hours, as given by Parkes, are the following :—

Water	1500·000 Grms.
Total solids	72·000
Urea	33·180
Uric acid	·555
Hippuric acid	·400
Kreatinin	·910
Pigment, etc.	10·000
Sulphuric acid	2·012
Phosphoric acid	3·164
Chlorine	7·000
Ammonia	·700
Potassium	2·500
Sodium	11·090
Calcium	·260
Magnesium	·207

Urine also contains various epithelial scales, a little mucus, nitrogen and carbonic-acid gases.

The reaction is acid, and the specific gravity is 1020.

METHODS OF EXPLORING THE URETHRA.

The urethra is explored by sound, finger, and speculum in the same way as the bladder. We need not therefore go into detail in these, but refer the student to methods of exploring the bladder.

We may remark, however, that the exploration by finger, sound, or speculum is not very satisfactory in the case of the urethra, as polypi become flattened against the urethral wall by finger or speculum and are thus overlooked. In such cases the button-hole operation of Emmet is useful and is performed as follows.

The patient is put in the lithotomy posture and a sound of calibre sufficient to stretch the urethra, passed. The object of the operation is to incise the urethra vertically and mesially but not to touch the meatus urinarius or neck of the bladder. The urethra is $1\frac{3}{8}$ inches long, and therefore an incision of the vaginal tissues over the urethra $\frac{3}{4}$ of an inch in length will avoid the urethral orifice and neck of bladder. The vaginal tissue is caught up with a tenaculum and divided down to its canal. The scissors are now used to extend this up towards the neck of the bladder and down towards the urethral orifice. The incision in the vaginal mucous membrane should be one-third longer than that into the urethral canal, and the extra length should be at the bladder end.

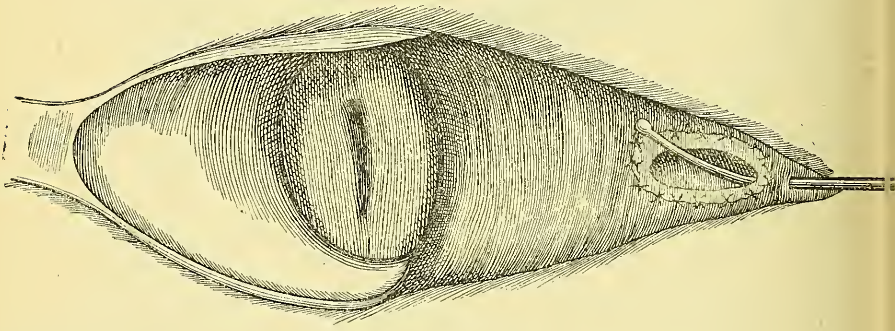

Fig. 349.

Emmet's Button-Hole Operation on the Urethra: the patient is supposed to be on her side and Sims' Speculum passed (*Emmet*).

No incontinence of urine is produced if the neck of the bladder be uninjured.

Through this incision polypi can be detected and removed, prolapse of the urethral mucous membrane can be excised, and medicaments applied.

Should the incision be made merely for temporary purposes it can be closed by silver stitches including the mucous membrane of the urethra. When the operator wishes to make a urethro-vaginal fistula for purposes of treatment, he unites the edges of the mucous membrane of the vagina to the corresponding edge of the urethral mucous membrane by means of catgut or silk (Button-hole operation—fig. 349). This fistula can be closed when necessary in the ordinary way.

For dilatation by Simon's specula, see page 600.

METHODS OF EXPLORING THE BLADDER.

A. *By Catheter and Sound.*

The catheter is passed for the purpose of drawing off the urine, while the sound is usually employed for diagnostic purposes—ascertaining the state of the mucous membrane, the presence of stone or other pathological conditions.

Method of passing the catheter. The instrument to be employed for this purpose is a male gum-elastic catheter, No. 8 or 10. In some special cases, a silver instrument is required. Battey recommends a long rubber catheter as a very useful instrument. The catheter must first be thoroughly washed with carbolic lotion (1-20), or corrosive sublimate (1-2000), and then its end dipped in glycerine and corrosive sublimate (1-2000). Cleanliness in the use of catheter is of the very highest importance, as cystitis and even pyæmia may be caused in old people by urine rendered putrid by the catheter.

The patient lies on the left side square across the couch, with the hips at the edge and the knees drawn up. The pulp of the index finger of the left hand is passed over the base of the perineal body and onwards until it touches the vestibule. It should then be carried a little backwards until we feel the meatus at the base of the smooth vestibule and in the middle line. The catheter is passed with the right hand; the index of the left hand feels, through the anterior vaginal wall, that it passes into the urethra. After the last drop of urine has been expelled, the catheter is withdrawn and the finger held over its proximal end so as to retain the fluid remaining in the catheter until it can be poured into a receptacle.

The catheter may also be passed with the patient lying on the back; the index of the right hand is carried under the drawn-up right thigh to feel the meatus, and the catheter is passed between the thighs with the left.

Battey's catheter is very convenient, as from its length it reaches to the floor and can be withdrawn without any precaution as to spilling.

Further, it is easily cleaned; to do this it is coiled up in a bowl of 1-20 carbolic lotion, and then when one end is brought over the edge it empties by syphon action. The indications for the catheter are the various causes of retention of urine (*v.* p. 614); at present we only remark that it should never be passed unless necessary, and that the greatest care should be taken not to introduce septic matter. Recently Foulis has recommended a special apparatus for washing out the bladder which may be used for drawing off the urine also.

B. *Digital and Specular Exploration of the Bladder.*

Owing to the large amount of muscular and elastic tissue in the urethra, it can be stretched to an extent that permits of digital and specular examination of the urethal and vesical lining membrane.

Dilatation of Urethra with finger,

Digital examination. With the patient lying in the lithotomy posture and under chloroform, the tip of the little finger is placed against the meatus and by a rotary motion passed through it in the direction of the urethral axis. The meatus is the most resistant portion of the urethra; therefore, to aid in its dilatation, some recommend to notch it with radiating nicks. This is unnecessary (*A. R. Simpson*). By steady pressure, the little finger is first pushed in and then the index one substituted. Hegar's dilators for the cervix are of great use here also. For exploratory purposes, this is sufficient; to complete the examination, however, the Bimanual should be performed as shown at fig. 67. This is aided by the middle finger in the vagina, and is therefore termed the vesico-vaginal Bimanual. Instead of chloroform, cocaine may be injected locally.

The presence of stone or of tumours, the state of the mucous membrane of the bladder, the nature of obscure bodies in front of the uterus can all be thoroughly ascertained; vesico-vaginal fistulæ can be examined if the vagina has been obliterated; intestino-vesical fistulæ can be detected; calculi, impacted in the vesical portion of the ureters, can be removed; fissures of the neck of the bladder can be stretched; Winckel adds to these that we can open a hæmatometra through the bladder, when its evacuation between the bladder and rectum is impossible—a very rare indication. The Fallopian tubes can be felt with the finger in the bladder (*Noeggerath*); and, in one special instance, Croom proved by this method that the sound had perforated the walls of the thin superinvoluted uterus and had not passed along the Fallopian tube.

with Specula.

Simon's methods of specular dilatation of urethra. Simon of Heidelberg drew special attention to the dilatation of the urethra by his specula as a means of treatment. The object is to dilate the urethra sufficiently to allow of the passage of calculi, crushed or uncrushed. By it we also destroy temporarily the sphincteric action of the urethra and thus cause incontinence of urine; this allows to the inflamed mucous membrane, now undisturbed by the frequent muscular contractions which before were necessary to expel the urine, the rest it needs. The difficulty of Simon's method is the risk of causing, by over-stretching, permanent incontinence of urine—a condition as yet uncurable.

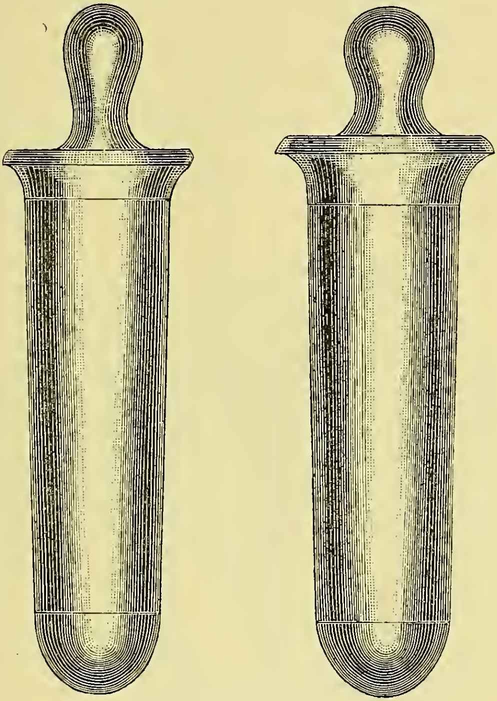

FIG. 349.*
SIMON'S URETHRAL SPECULA (*Winckel*).

Simon's Specula.

Simon's specula are shown at fig. 349*, and the various sizes at fig. 350. The specula are provided with bulbous plugs, to be used while they are being introduced and afterwards withdrawn. Simon estimated

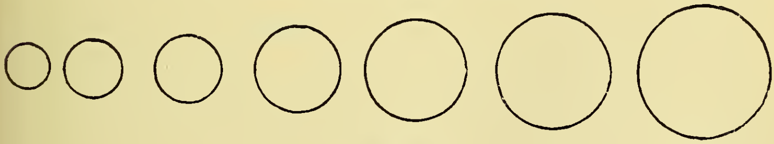

FIG. 350.
THE VARIOUS SIZES OF SIMON'S SPECULA (*Winckel*).

the limit of safe dilatability for the female urethra at various ages as follows:—*Adults*, 6-6·25 cm. ($2\frac{6}{16}$-$2\frac{7}{16}$ in.) in circumference, or 1·9–2 cm. ($\frac{3}{4}$ in.) in diameter; *young women* (of 15-20 years), 5·6–6·3 cm.

in circumference, or 1·8–2 cm. ($\frac{3}{4}$ in.) in diameter; *girls* (of 11-15 years), 4·7–5·6 cm. ($1\frac{7}{8}$–$2\frac{1}{8}$ in.) in circumference or 1·5–1·8 cm. ($\frac{9}{16}$ in.-$\frac{11}{16}$ in.) in diameter.

Practically, we find that the index finger can be passed with safety; and that any dilatation beyond an inch diameter is dangerous in regard to permanent incontinence.

Persistent incontinence has attended the extraction of stones with a diameter of $1\frac{3}{8}$ in., but Dunlap[1] has recorded a case where a stone $2\frac{1}{8}$ in. in diameter was safely extracted uncrushed through the urethra without consequent incontinence of urine.

The dilators of Simon are graduated, and are passed slowly until the desired limit is reached.

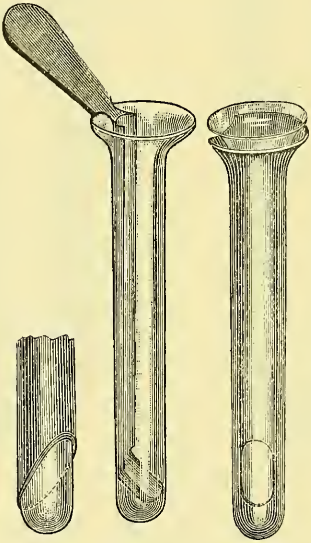

FIG. 351.
SKENE'S URETHRAL SPECULA (*Skene*).

It is doubtful if they can, without risk, be used as Simon recommends.

Skene's Specula.

Specular examination by Skene's specula. Fig. 351 shows Skene's specula. Each may be described as a small test tube which fits into a truncated or fenestrated case of vulcanite. The glass tube projects beyond the outer truncated case; and a small mirror can be carried through the inner tube so as to reflect light.

Skene's directions are to pass the tube (with mirror inside) along the urethra, and to use sun-light or gas-light from a movable bracket. When a large Skene's speculum is used, the urethra should be first dilated with the index finger. When viewed through the speculum, the mucous membrane of the bladder is somewhat pale.

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[1] *Am. J. of Obst.*, Vol. XIV., p. 855.

The hard rubber speculum can be used in making applications.

A specially narrow Fergusson's speculum with a hand mirror is also simple and useful (*M. Duncan*).

c. *Catheterisation of the ureter.*

This is by no means an easy operation, but is useful in certain cases.

Catheterisation of Ureter.

Method of Performance. Pass the index finger into the bladder as already described (p. 600); about an inch from the neck of the bladder and at each end of the inter-ureteric ligament, a prominence (in which is the vesical opening of the ureter) can be felt with the pulp of the examining finger. A fine hollow probe is guided into this and its point carried to the side (fig. 352). The urine will now trickle out drop by drop. According to Pawlik,[1] the inter-ureteric ligament can be felt through the anterior vaginal wall when the patient is in the genu-pectoral posture. He thus passes the ureteric catheter without dilating the urethra.

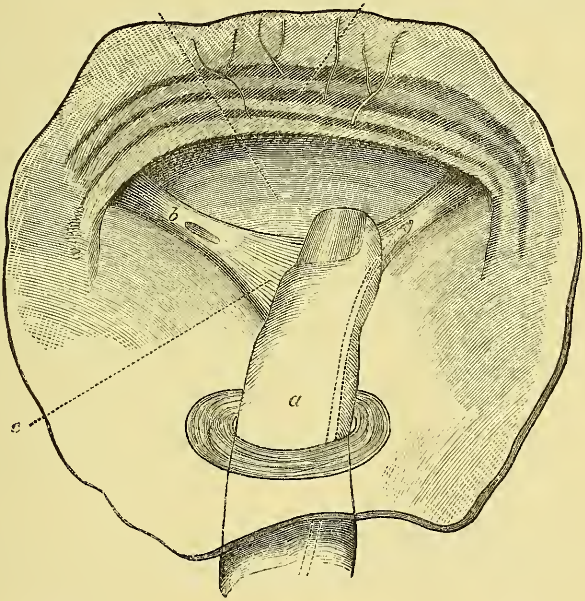

Fig. 352.
Finger passed through Urethra into Bladder to guide hollow Probe into left Ureter.
a Internal Sphincter of Urethra, *b* Orifice of right Ureter, *e* Inter-ureteric Ligament (*Winckel*).

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[1] *Centr. f. Gyn.*, Oct. 15, 1881.

Electric Endoscope.

This handy and convenient instrument has now been used with great success in the diagnosis of vesical conditions. It would take up too much space to describe its construction and use fully: these can be found in the special works on this subject. We may, however, state that the instrument has been brought to its present value chiefly by the labours of Nitze and Leiter, and that the introduction of the small incandescent lamp as the illuminating agent has probably been the greatest improvement.

By this means we can ascertain the position of the ureter in operating on vesico-vaginal fistula and prior to excision of the cancerous uterus; and in proposed excision of a kidney we can ascertain the state of the other kidney by examination of the urine from it.

CHAPTER LIII.

AFFECTIONS OF THE URETHRA AND BLADDER.

For Literature, *see* Chapter LI.

MALFORMATIONS OF THE URETHRA AND BLADDER.

These comparatively rare malformations are easily understood on consideration of the development of the organ.

The bladder is the part of the allantois included by the abdominal plates of the embryo (figs. 317 to 321); the upper portion of the posterior wall of the urethra is formed by Müller's ducts, while the lower is formed by an invagination from the genito-urinary sinus. The developmental defects are therefore the following:—

(1) Total absence of urethra;
(2) Defect of external portion of urethra—hypospadias;
(3) Defect of internal portion of urethra;
(4) Atresia of the urethra (in malformed fœtuses);
(5) Extroversion of the bladder from deficient closure of the embryonic abdominal plates.

We would here only note the rarity of these conditions, and refer the practitioner to Skene or Winckel for details.

DISEASES OF THE URETHRA.

Of these the most important are Displacements, Neoplasms, Urethritis, Dilatation, and Stricture.

DISPLACEMENTS.

These will be easily understood by reference to those of the bladder.

Urethrocele is a pouching of the urethra and vaginal wall allowing the lodgment of stale urine. It is treated by excising a portion of the urethral wall and uniting the edges by stitches.

Prolapse of the mucous membrane of the urethra through the urethral orifice may be remedied by the button-hole operation. The incision is made down to the submucous tissue, and the mucous membrane pulled through this until the excess at the urethral orifice disappears. The excess at the button-hole is then cut off and the wound stitched.

NEOPLASMS OF THE URETHRA; URETHRAL CARUNCLE.

Urethral Caruncle. The urethra is liable to be invaded by papillomata, polypi, sarcomata, (cysts), carcinomata, and vascular growths (angiomata).

Of these last, the most common is the well-known Urethral Caruncle.

Pathology. This is a vascular excrescence varying in size from a pin head to a strawberry; it consists of dilated capillaries in connective tissue, the whole being covered with squamous epithelium. *Physical Signs.* A cherry-red tumour, exquisitely tender and vascular, is seen at the urethral orifice (fig. 353). *Symptoms.* These are pain on micturition or even retention of urine, and pain on coitus. *Treatment.* Place the patient under chloroform in the lithotomy posture, and destroy the growth by Paquelin's cautery at a dull heat. If bleeding occurs, do not treat it lightly; plug the vagina, bringing the half of the last strips of lint over the urethral orifice and fixing with a perineal band.

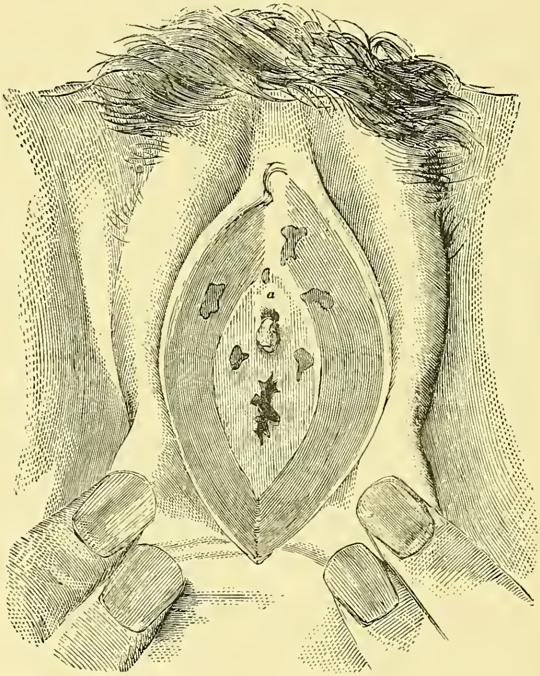

Fig. 353.

Caruncle at Urethral Orifice (*a*) and, in addition, Neuromata in surrounding Mucous Membrane—see page 518 (*Sir J. Y. Simpson*).

As regards the other neoplasms, papillomata are painless, sarcomata very rare, their nature being determined microscopically; while carcinomata appear as hard peri-urethral tubercles which break down (*Skene*). In regard to treatment, they may be removed by the curette, or by small loop-snares when high up. Emmet's button-hole operation is probably the best method. Polypi in the urethra may cause great difficulty in micturition and should be suspected in intractable cases, and examination made by incision of urethra. We may also have specific inflammatory changes in Skene's "tubules" (*v.* p. 30) simulating urethral caruncle. These may be gonorrhœal, simple catarrhal, or tubercular. The last is usually found with tubercular disease elsewhere.

The tubules may require to be slit up and cauterized.

URETHRITIS.

Acute urethritis is usually part of a gonorrhœa. When pus is secreted, the urethra can be felt swollen and tender; the pus can be squeezed out of the urethral orifice by pressure from above downwards; on passage of the sound, pain is felt in the urethra although no cystitis be found.

Treatment. Give diluent drinks so as to increase the flow of urine. Copaiba may be given in the form of the well-known Nesbitt's specific:—

℞ Liquoris Copaibæ Co. (Nesbitt) ℥ij.
Sig. Teaspoonful thrice daily.

Iodoform bougies may be passed in, and counter-irritation applied in the shape of the tincture of iodine over the anterior vaginal wall.

Urethritis is very intractable. Emmet advises his button-hole operation to relieve tension and allow of accurate application of local remedies.

DILATATION, AND STRICTURE OF THE URETHRA.

The urethra may be unusually *dilated*, a condition rarely met with; in some cases the dilatation has been caused by coitus, as in malformations of the vagina (*v.* p. 260). The dilatation may be local or general. When it is general, the cautery may be used to burn a vertical furrow, the rest of the urethra being guarded by a speculum.

Stricture of the urethra is a rare condition and readily yields to dilatation by bougies or to incision.

DISEASES OF THE BLADDER.

Of the diseases of the bladder we shall here consider Displacements, Neoplasms, Stone in the Bladder, and Cystitis. Vesico-vaginal fistula will be considered in a separate chapter (Chap. LIV.).

DISPLACEMENTS OF THE BLADDER; CYSTOCELE.

The female bladder when empty lies behind the pubes and usually to one or other side. It is never exactly central.

The mobility of the Bladder.

From its loose attachment to the pubis, it is pre-eminently displaceable. (1) It is drawn up during labour; and (2) is displaced upwards by retroversion of the gravid uterus, pelvic ovarian or fibroid tumours, and pelvic hæmatocele. (3) It may be adherent to the anterior surface of an abdominal ovarian or fibroid tumour, and may thus be cut into on abdominal section. (4) It is displaced downwards in prolapsus uteri and in cystocele. (5) In utero-sacral cellulitis, the bladder is drawn back and fixed; its systole is thus interfered with, which explains some cases of so-called hysterical retention of urine. From this mobility it follows that the height of its fundus above the symphysis gives no indication of the amount of urine in the bladder.

By *cystocele* we understand a pouching of the posterior wall of the bladder downwards and backwards; the uterus and summit of the bladder are in normal position.

Senile form of Prolapsus.

Many a case, regarded as cystocele, is really part of a prolapsus uteri; on the other hand, the so-called "senile prolapsus uteri" is really a cystocele; at the menopause the cicatrisation of the vaginal walls chiefly affects the posterior one, and thus the bladder tends to bulge outwards at the vaginal orifice.

The diagnosis is easily made by the Bimanual and use of the sound. The treatment consists in the use of a ring pessary with diaphragm (fig. 334). Should this fail, the vagina may be packed with oakum; or a raw surface (as shown at fig. 344) may be made and stitches applied.

NEOPLASMS OF THE BLADDER.

Pathological anatomy. We may have mucous, fibroid or fibro-myomatous polypi. There may also be sarcomatous or carcinomatous disease of the bladder wall, as well as tubercle. In tubercular disease the ulcerated surface has been removed by Schatz in a supra-pubic operation. The carcinomatous condition is not infrequent, and is termed by some "villous cancer." It is most common at the trigone, and is held by some authorities not to be malignant. The bladder may be secondarily affected in carcinoma uteri (*v.* p. 438).

Symptoms. These are disturbances of micturition, with bloody and phosphatic urine.

Physical signs. The passage of the index finger into the bladder will show the position, shape, and other characters of the growth.

Treatment. This will vary according to the position, nature, and pediculation or non-pediculation of the growth. Thus it may be twisted off by narrow polypus forceps, snared by a loop of fine catgut; or removed by incision into the posterior wall of the bladder and use of the galvano-cautery or curette.

CYSTITIS.

Nature. An acute or chronic inflammatory affection of the mucous membrane of the bladder.

Pathological anatomy. In the acute catarrhal form, we have congestion of the vessels and loss of epithelium ; in the chronic catarrhal form, the congestion is duller and there is marked rugosity of the lining of the bladder. The submucous and even the muscular tissues also become affected. The mucous membrane may be ulcerated and the muscular tissue exposed.

The inflammatory process may extend deeper, to the muscular tissue (interstitial cystitis), to the peritoneum (pericystitis), or to the connective tissue near (paracystitis). Occasionally, though rarely, we may have diphtheritic inflammation.

Results of Cystitis.

In advanced cases, the patient is usually septicæmic and there is often hydro-nephrosis. In some cases of prolonged retention the mucous membrane may slough off and be passed per urethram, but may be regenerated.

Etiology. The causes are as follows :—Gonorrhœa ; latent gonorrhœa ; exposure to cold ; injury from coitus ; prolonged parturition ; introduction of septic matter by catheter or bougie ; prolonged retention of urine ; stone.

Symptoms. In *acute cystitis* the patient has very frequent and painful micturition. In *chronic cystitis* also, there is frequent micturition but accompanied with less intense pain ; there are, further, shooting pains with secondary phenomena—septic, vascular, and nervous.

Physical signs. (*a*) *Acute cystitis.* The urine has a lowered specific gravity and acid reaction ; the colour is little altered, and mucus is present in excess. On vaginal examination, pain is not felt when pressure is made on the posterior vaginal wall but is felt severely *when the anterior wall is touched.*

Characters of Urine in Cystitis.

(*b*) *Chronic cystitis.* The urine has a low specific gravity, is usually alkaline, and is often offensive ; it contains pus, epithelium, phosphates and bacteria ; albumen, derived from the pus, is present. The vaginal examination gives the same results as in acute cystitis. If the finger be passed through the urethra (*v.* p. 600), the roughened condition of the lining membrane is felt ; crystals of phosphate and marked rugosities can also be detected.

Genito-urinary phthisis is often diagnosed as chronic cystitis. In the former condition we get at first the symptoms of chronic cystitis, viz., purulent urine, pain, and intractability to treatment. Local examination of the bladder may give no definite result, and if the kidney is not palpated its enlargement and purulent condition may not be noticed until the disease is far advanced.

Prognosis. In both acute and chronic cystitis, the prognosis is not good; the treatment is difficult, and in bad chronic cases the patient's strength sometimes becomes exhausted and septicæmia may cause death.

Treatment of Acute Cystitis.

Treatment. (*a*) *Acute cystitis.* Put patient on milk diet, and give Friedrichshall or Carlsbad water freely. Diluent drinks may be taken *ad libitum.*

The following prescription is useful.

℞	Potassii Bicarbonatis	ʒ iss.
	Tincturæ Hyoscyami	℥ i.
	Infusum Buchu vel Pareiræ vel Uvæ Ursi ad	℥ vj.
	Sig. Tablespoonful thrice daily.	

In gonorrhœal cystitis, the following may be substituted:—

℞	Liquoris Copaibæ Co. (Nesbitt)	℥ ij.
	Sig. Teaspoonful thrice daily.	

Treatment of Chronic Cystitis.

If the pain is very acute give morphia suppositories ($\frac{1}{4}$ grain) at night, omitting the mixture with the hyoscyamus if necessary.

For (*b.*) *Chronic cystitis*, we recommend the following treatment *seriatim.*

1. Put on milk diet with abundant fluids, and purge freely. Give

℞	Acidi Nitrici diluti	ʒiij.
	Tincturæ Hyoscyami	℥i.
	Infusum Buchu ad	℥vj.
	Sig. Tablespoonful thrice daily.	

The hyoscyamus eases the pain; and the nitric acid corrects the alkaline phosphatic urine, for which also benzoate of ammonia is admirable.

℞	Ammonii Benzoatis	ʒiii.
	Aquæ	℥ vj.
	Sig. Tablespoonful thrice daily.	

The benzoate of ammonia is converted into hippuric acid and corrects alkalinity. Lithia water, tincture of Belladonna, and Nesbitt's specific are also useful.

2. If this fail, then wash out bladder as often as possible by means of double catheter, such as Skene's; use corrosive sublimate (1-5000 or 8000), weak boracic lotion, or carbolic lotion; inject with the douche or Higginson's syringe, or use Foulis' apparatus. We strongly recom-

mend weak corrosive sublimate as a bladder douche. Paint anterior vaginal wall with tincture of iodine.

3. A long (winged) india-rubber catheter may be kept in the bladder so as to drain off the urine constantly and give the bladder rest. The patient need not remain in bed if the Skene-Goodman catheter (fig. 354) is used.

4. In obstinate cases, the formation of an artificial vesico-vaginal fistula may be tried. To do this, chloroform the patient; place her in the lithotomy posture and apply Sims' speculum. Open into the bladder through the anterior vaginal wall, in the middle line, with Paquelin's cautery at a dull heat. This may also be done with the scissors, as follows: pass the finger into the bladder, and then by means of a pair of straight scissors cut it open in the middle line. Preliminary dilatation of the urethra with the finger enables the operator with certainty to avoid cutting into it. The advantage of the cautery is that the wound does not readily unite; when the opening is made with knife or scissors, care is required to prevent its healing. Emmet stitches the vesical and vaginal edges together.

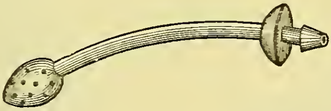

FIG. 354.
THE SKENE-GOODMAN SELF-RETAINING CATHETER; AN INDIA-RUBBER BAG CAN BE WORN WITH IT (*Skene*).

The urine trickles through the artificial fistula; in this way, the bladder gets complete rest and can be thoroughly washed out.

After some months the fistula is easily closed, as in the operation for vesico-vaginal fistula. Severe cases of cystitis will tax more than any other disease, the practitioner's patience and knowledge. It is well to keep in mind the reason of this intractability, viz., the inability of the bladder to remain at rest.

As can be seen from what has gone before, the principles of treatment are the following:—(1) to correct abnormalities in the urine; (2) to allay the irritability of the bladder; (3) to lessen the congestion of the bladder by purgatives and counter-irritants, and to render the urine bland and lessen the work of the kidney by milk diet; (4) to allay the irritable condition of the bladder and counteract putrefaction or gonorrhœal inflammation by injection; (5) to give it complete rest by a permanent catheter or, in extreme cases, by an artificial fistula.

CALCULI AND OTHER FOREIGN BODIES IN THE BLADDER.

The female bladder is liable to receive foreign bodies from three sources.

A. Calculi from the kidneys—uric acid, oxalates, phosphates or cystine.

B. Substances from neighbouring organs—pus from pelvic abscess, concretions from the intestines, bones from an extra-uterine fœtation, pessaries from the vagina, echinococci and other parasites such as those associated with chyluria.

C. Foreign bodies introduced wilfully into the bladder by patients of a depraved taste ; these may form nuclei for stones (fig. 355).

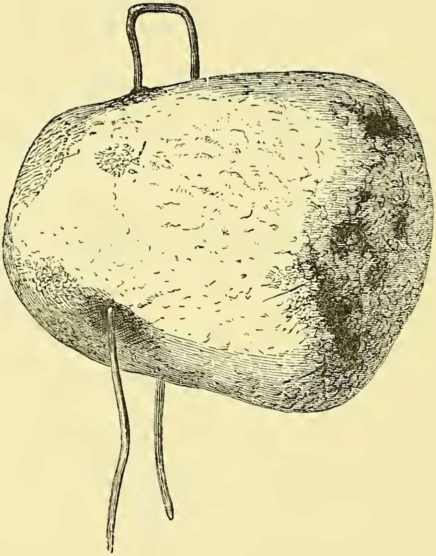

Fig. 355.

Large Stone which formed Round a hair-pin as Nucleus, extracted by Vaginal Lithotomy (*Angus Macdonald*).

Of these, *calculi* are the most important. Stone is less common in the female than in the male, as small calculi can pass along the dilatable female urethra ; occasionally, therefore, the gynecologist has to remove from the urethra small stones impacted there—usually at the meatus urinarius. The introduction of foreign bodies, which act as nuclei, is more common in the female.

Symptoms. These are severe pain in micturition, especially at the close ; alterations in character of urine ; blood in urine.

Diagnosis of Calculi.

Physical signs. The stone, when at all large, can be easily detected bimanually; when any doubt exists, the use of the sound or the passage of the finger into the bladder renders the diagnosis easy.

Treatment. Measure the stone: if it be less than an inch, it may be extracted through the urethra dilated first by the finger or Simon's specula; if greater than an inch, then dilate the urethra and crush; if very large or hard or if it have a nucleus, extract by vaginal incision. This incision may be stitched up after the operation, or kept open when the bladder has been much irritated; it can afterwards be stitched as in vesico-vaginal fistula. Supra-pubic lithotomy is sometimes required.

For other foreign bodies, the urethra can be dilated and the substance grasped by polypus forceps or manipulated out. When large, they may be extracted as in the case of large stones.

FUNCTIONAL DISEASES OF BLADDER.

Functional affections of the Bladder.

By these we understand derangements of the bladder in regard to urination. Either these are due to causes as yet unascertained, or the same derangement (*e.g.*, retention) is associated with many lesions.

The chief functional diseases are—

Irritability,
Incontinence,
Retention.

In regard to all of them, we may remark that in no case should the diagnosis of a functional disease of the bladder be made until the practitioner is satisfied that there is no organic lesion.

Irritability. In this, frequent micturition associated with disagreeable feeling is present. It may be due to excessive acidity of the urine, but is often a nervous affection. When it is due to excessive acidity, give lithia or potash.

℞ Lithii Carbonatis gr. v.
Fiat pulv. mitte tales vj.
Sig. One thrice daily.

Incontinence, or inability to retain urine long enough, is most common in little girls; occasionally we meet with it in adults, as the result of prolonged labour, as a permanent condition from infancy, or in oxaluria cases.

In the incontinence of girls, note whether there be any irritability of the genitals (vulvitis) or ascarides. Goltz found that, where section of the spine in the dog above the lumbar enlargement had produced retention of urine, he could make it urinate by sponging the anus with cold water; a reflex impulse passed from the rectum, lessening the activity of the inhibitory centre and allowing bladder contraction. In a child, ascarides in the rectum will act in the same way when it is asleep.

Treatment. Treat the irritating cause—as vulvitis or ascarides. If no irritating cause be detected, then give belladonna.

℞ Tincturæ Belladonnæ ʒij.
Sig. Three drops thrice daily.

In strumous cases, give syrup of the iodide of iron or cod liver oil.

℞ Syrupi Ferri Iodidi ℥ij.
Sig. Thirty drops thrice daily.

Retention of Urine. Palpation shows a fluctuating mesial tumour rising into the abdomen; the position of the fundus of the bladder gives no indication of the amount of urine, as it may be tilted up by retroversion of the gravid uterus. Remember that a bladder may be distended so as to be as large as a six or eight months' pregnancy, and that constant dribbling-away of the urine may be a symptom of retention. Examine the pelvis for an organic lesion.

Retention may be due to one of three great classes of causes:—

Hysterical,
Reflex,
Mechanical.

1. *Hysterical.* By this we mean that from perversity or a prurient desire to have the catheter passed, a patient feigns inability to pass urine.

The treatment is to give a hot hip bath followed by a cold one; if the catheter is needed, get it passed by a nurse of unsympathetic tendencies.

2. *Reflex* causes are the following:—

(1) Gonorrhœa;
(2) Urethritis;
(3) Irritable caruncle;
(4) Carcinoma, urethral and vaginal;
(5) Perineal and especially vestibular tears after labour, tears of cervix;
(6) Ligature of internal piles.

The treatment is hot appliances in (1), (2), (3), and (5) and (6); and the catheter in (4). Remove the source of irritation when possible.

3. *Mechanical.* These are pressure of fibroids, retroversion of the gravid uterus; ovarian or parovarian tumours (pelvic and retro-uterine).

Where the tumour is impacted in the pelvis, a silver male (No. 10) catheter will pass best. The urethra is compressed, the bladder bulging over the symphysis; accordingly, a rigid instrument whose handle can be carried to the perineum is good.

CHAPTER LIV.

VESICO-VAGINAL FISTULA.

LITERATURE.

Baker Brown—Surg. Diseases of Women, 3d Ed., p. 133; and Lancet, March 1864. *Bandl*—Wiener Med. Woch., 1875, Nos. 49 to 52; and 1877, Nos. 30 to 32. *Bozeman*—Remarks on Vesico-vaginal Fistula, 1856; Americ. Journ. of Med. Science, July 1870; Obst. Journ. of Great Britain, June to Aug. 1878. *Byford*—Medical and Surgical Diseases of Women: Philadelphia, 1882. *Emmet*—On Vesico-vaginal Fistula: New York, 1868. *Hegar und Kaltenbach*—Die Operative Gynäkologie, S. 582: Stuttgart, 1881. *Simpson, Sir J. Y.*—Diseases of Women, p. 30: Edin. 1872. *Sims, Marion*—On the Treatment of Vesico-vaginal Fistula: Americ. Jour. of Med. Science, Jan. 1852. Silver Sutures in Surgery: New York, 1858. *Simon*—Ueber die Heilung der Blasenscheidenfisteln; Giessen 1845, Rostock 1862, and Wiener med. Wochenschrift, 1876, Nos. 27–32. *Winckel*—Die Krankheiten der weiblichen Harnröhre u. Blase: Stuttgart, 1877, S. 95. For recent literature, see Index in Appendix.

PATHOLOGICAL ANATOMY AND VARIETIES.

The septum between the urinary and genital tracts may be broken through at various points. According to their situation, we have the following varieties of urinary fistulæ:—

Urethro-vaginal,
Vesico-vaginal,
Vesico-uterine,
Uretero-vaginal,
Uretero-uterine.

The situation of these is sufficiently indicated by their names, and will be easily understood by reference to fig. 356.

A urethro-vaginal fistula rarely occurs alone, but is sometimes present along with a vesico-vaginal one. It lies in the middle line and is, naturally, of smaller size.

Pathology of Vesico-vaginal Fistula.

By far the most frequent are the vesico-vaginal fistulæ. They may occur at any point of the vesico-vaginal septum, which measures in height (from the internal orifice of the urethra to the vaginal fornix) about 5 cm. and in breadth 4 cm. (*Kaltenbach*). Their size varies from a pin-point or slit-like hole to a large oval (fig. 361) or four-cornered (fig. 383) aperture. When recent they are of larger size, but after some months become contracted through the formation of cicatricial tissue. The *margins* of the *fistula* are at first irregular, swollen, and ulcerated; but after a time they become thin and firm, through cicatrisation: these changes have an important bearing on treatment. Jobert divided fistulæ in the anterior fornix into *superficial* and *deep;* in the former (fig. 357) the anterior lip of the cervix was not implicated, in the latter it was more or less destroyed (fig. 358). In cases of fistulæ which

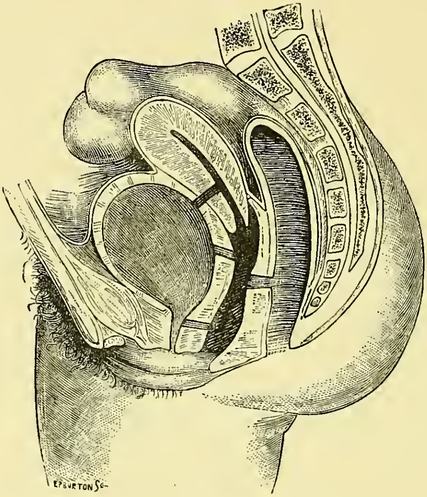

FIG. 356.

TO REPRESENT THE CHIEF VARIETIES OF URINARY FISTULA—URETHRO-VAGINAL, VESICO-VAGINAL, AND VESICO-UTERINE. Those with the ureters are not seen. The seat of a recto-vaginal fistula is indicated (*De Sinéty*).

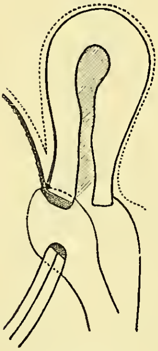

FIG. 357.

SUPERFICIAL VESICO-VAGINAL FISTULA, the Cervix is intact (*Hegar and Kaltenbach*).

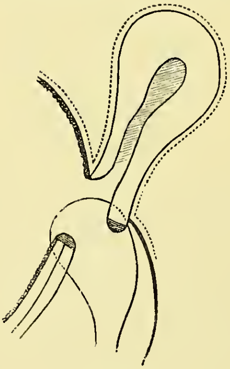

FIG. 358.

DEEP VESICO-VAGINAL FISTULA, the anterior lip of the Cervix is destroyed (*H. and K*).

allow a free flow of urine, the *bladder* becomes permanently contracted and its walls thickened; in large fistulæ, the mucous membrane protrudes through the opening and is easily recognised from its deep red colour. The normal relation of the openings of the *ureters* to that of the urethra and to the cervix uteri (fig. 359) renders them liable to be involved in an extensive fistula, or even in a small one lying to one side of the middle line. Sometimes we can recognise their openings on the exposed vesical mucous membrane by means of the urine trickling from the orifices; should the urine be bloodstained, it can be distinguished from blood by its acid reaction to test paper. The *urethra*, through disuse, becomes contracted; sometimes complete atresia is present and seriously complicates treatment, and a portion of the canal may even be completely destroyed by pressure (*v.* fig. 388). The *vagina* is often contracted by cicatricial tissue originating from injuries received during labour. The margins of the fistula are often drawn apart, and sometimes fixed down to the bone, by these cicatrices; this interferes with their closure. Contraction of the vagina below the fistula sometimes makes it impossible to ascertain the condition of the upper part and whether the uterus communicates with the fistulous tract. The relations of the *peritoneum* to fistula are shown in fig. 360, from which it is evident that only in the repair of very extensive fistulæ would its relations require to be considered. The difficult labour which leads to the production of the fistula is liable to be followed by puerperal peritonitis or cellulitis; these may disturb the normal relation of the peritoneum.

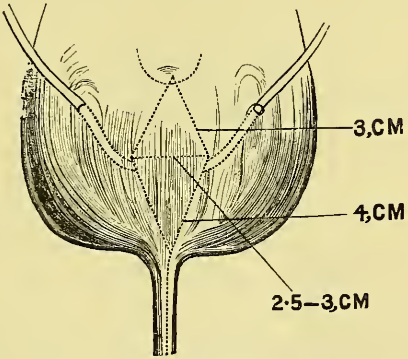

Fig. 359.

The Normal Relation of the Cervix, the Ureters, and the Urethra (*H. and K.*) From cervix to orifice of ureter measures 3 cm., from orifice of ureter to that of urethra measures 4 cm., from orifice of one ureter to that of the other measures 2·5 to 3 cm. The ureters run through the bladder wall in an oblique direction downwards and inwards, for from 1·5 to 2 cm.

Vesico-uterine fistulæ are rare. From their position they can be recognised only after dilatation of the cervical canal (*v.* fig. 387), and it is evident that they must be very small.

Uretero-vaginal fistulæ are situated in the fornix vaginæ. They are of small size, admitting only the point of the sound, and have either sharp edges or open at the point of a small papilla.

Josephson[1] cites twenty-three cases, and finds that it has arisen from injury in labour (when the ureter has been fixed to the uterus), from association with a vesico-vaginal one, from operations on cervix and excision of uterus, and has also been congenital (four cases).

Of uretero-uterine fistula, twelve cases were collected by him.

ETIOLOGY.

Malignant disease is the most common cause of fistula (*v.* p. 466); but we place this form aside, as it is beyond treatment and merely indicates a stage in the progress of the malignant growth.

Mode of production of Fistula in Labour.

The most important cases of fistulæ which we have to consider here, arise through *injury received during labour.* This injury may act *directly*, producing laceration of the septum; more frequently it acts *indirectly*, producing necrosis secondary to pressure or inflammation. The causes which predispose to fistula are a narrow pelvis and pendulous abdomen, a firm or large head (hydrocephalus), and face presentations (*Winckel*). The immediate cause is the compression of the soft parts between the child's head and the bony wall of the pelvis; if this pressure continues for a long enough time, it destroys the vitality of the soft parts which afterwards separate as a slough.

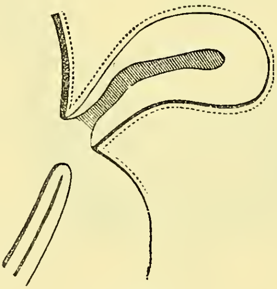

FIG. 360.

RELATIONS OF PERITONEUM, indicated by dotted line, to a fistula which has destroyed the whole of the anterior wall of the cervix and the infra-vaginal part of the posterior wall (*H. and K.*)

Fistulæ produced by instruments are situated in the lower part of the vagina, and are accompanied with extensive cicatrices and adhesions; those due to pressure of the fœtal head are placed in the upper part (*Winckel*). In craniotomy, the soft parts have been sometimes lacerated by the instruments, or by splinters of fœtal bone. Forceps are often cited as a cause of the injury. It is not however *the use* of the forceps after a prolonged labour which is to blame, but the *not using* of them at an early period—before the parts have been destroyed by pressure.

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[1] *Lancet*, 1887, p. 496.

Fistulæ have followed diphtheritic inflammation in the puerperium, but this is rare. Inflammation and ulceration round badly fitting pessaries have also produced them.

SYMPTOMS.

The leading symptom is the *involuntary flow of urine* from the vaginal orifice. *This will not appear until the slough separates*, that is till about the third or fourth day; its separation may be delayed for three or four weeks, when the necrosis is secondary to puerperal vaginitis (*Byford*). When a direct laceration has been produced, the urine will flow *at once* per vaginam; but even here it may escape notice till the second or third day, as it is masked by the lochial discharge.

The power of retaining varies, in certain cases, with the position of the patient; with a fistula situated high up, the erect posture allows the lower portion of the bladder to be used though the flow is continuous in the recumbent posture. With a urethro-vaginal fistula, there may be perfect continence from a sphincter-like action of the muscular fibre in the wall of the urethra; the patient observes, however, that the urine does not pass by the urethral orifice.

Secondary symptoms are due to a constant wetting of all the surrounding parts with the urine. The urinous *odour* is quite characteristic in urinary fistula; there is *excoriation* round the vulva, the inside of the thigh is red and irritated. *Menstruation* is generally in abeyance, returning after the fistula has been cured. There is usually *sterility;* although cases of conception, often followed by abortion or premature labour, have been recorded. The disagreeable surroundings interfere with the appetite and digestion; there is *constipation*, which Freund has ascribed to increased secretion by the kidneys but which is more probably due to reflex contraction of the muscular fibre of the rectum (*Winckel*). The general health thus becomes seriously impaired so that the patient is willing to submit to any operation which promises relief.

DIAGNOSIS.

The irritated appearance of the external genitals with the characteristic odour at once indicates that there is fistula, but the diagnosis of its position is often very difficult.

Urethro-vaginal and *vesico-vaginal. When large*, these may be felt by the examining finger; on our passing the sound into the bladder the finger touches it through the fistula. The speculum shows their position and extent, and reveals smaller ones which escape detection with the finger; by stretching the folds of the mucous membrane with tenacula, we may detect a fistula concealed by them.

To recognise *small vesico-vaginal* fistulæ and to differentiate them from the *vesico-uterine* and *ureteric*, proceed as follows:—pass Sims' speculum, carefully wipe away all mucus from the anterior vaginal wall, clear out the cervical canal with a dressed sound and plug it with a pledget of dry cotton wadding; now pass a catheter, and through it distend the bladder slowly with a coloured fluid such as milk or permanganate of potash; as the bladder distends, watch carefully the anterior vaginal wall for any oozing of the fluid. If there is no oozing, the fistula is not vesico-vaginal. If on withdrawing the plug from the cervix it be found stained with fluid, the fistula is *vesico-uterine*. If neither of these forms be present, the urine must come from a *ureteric* fistula; the rarity of this form should lead us to suspect that the fluid may have been temporarily kept from escaping from the bladder by a valvular action of the mucous membrane, and the examination should be repeated after a time. In a case of uretero-uterine fistula, Bérard collected the urine which escaped per vaginam in one vessel and that in the bladder was drawn off per urethram by a catheter into another; the quantities in a given time were found to be equal. His conclusion was that he had obtained the secretions from each kidney separately, so that the fistula was ureteric.

PROGNOSIS.

A natural cure will depend on the recentness of the fistula and its size. Small fistulæ, if kept clean, heal of themselves during the puerperium. Large ones require *operative treatment;* cure by this means depends partly on the size of the fistula, but more on the condition of its margins—whether they contain much cicatricial tissue, and whether they are bound down.

TREATMENT.

There are two essentials for successful operative treatment: (1) complete exposure of the fistula, so that (2) the edges may be thoroughly pared and carefully adapted with sutures. The great difficulty lies in the inaccessibility of the field of operation, to which the failure of the older operative measures is chiefly to be attributed.

Marion Sims (1849) first rendered successful treatment really possible by the complete exposure of the fistula with his *speculum*, and by the *careful adaptation* of its margins with *silver-wire sutures*. Since the introduction of *catgut*, we believe that it will displace silver wire in this operation as it does not need to be removed subsequently. To Simon of Heidelberg is due the credit of having elaborated the operation, and of having extended its sphere so that almost no form of fistula has in his hands proved incapable of treatment. We may shortly contrast the methods of these two leading operators as follows: Sims pares the edges of the fistula in a sloping manner (fig. 363) carefully avoiding the mucous membrane of the bladder, then adapts the margins of the fistula with silver wire, and drains the urine continuously per urethram through a catheter; Simon pares away the edges vertically not specially avoiding the mucous membrane of the bladder, unites the edges with silk sutures, and encourages the patient to pass water unaided from the first—drawing it off with the catheter only when necessary. Bozeman, a pupil of Sims, has drawn attention to the advantages of the genu-pectoral posture in operating and to the importance of preparatory

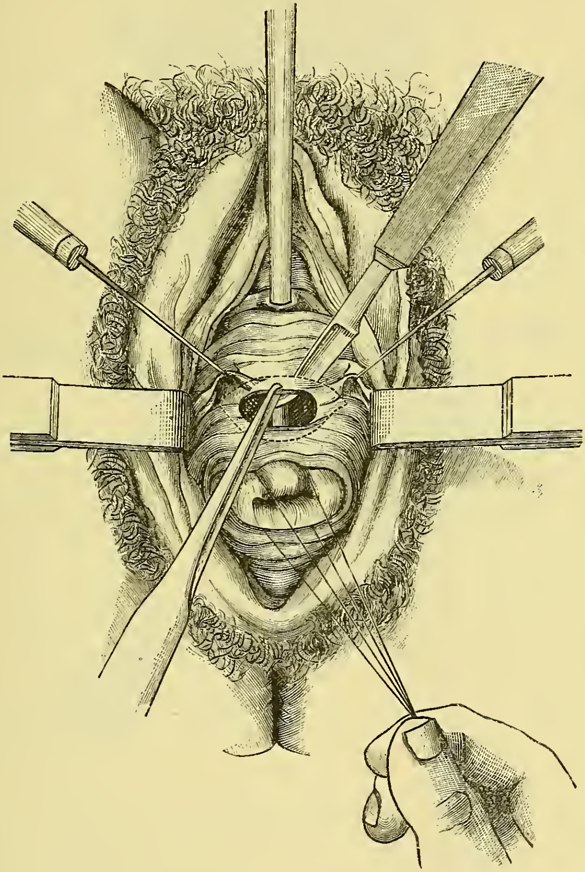


Fig. 361.

Method of Paring the Edges of a Fistula (*Simon*).

treatment by dividing and stretching cicatricial contractions; he fixes the sutures with lateral plates and buttons.

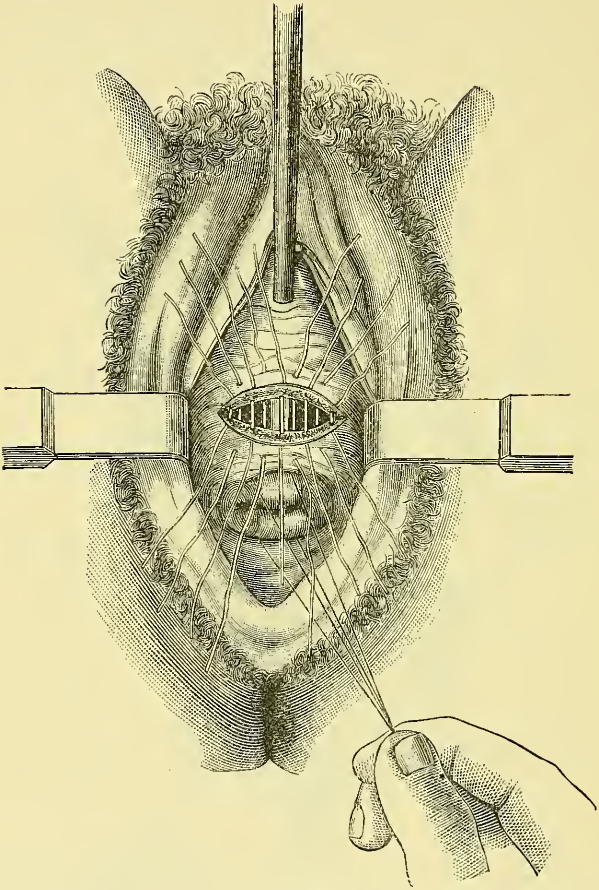


FIG. 362.
SUTURES PASSED IN A CASE OF URINARY FISTULA (*Simon*).

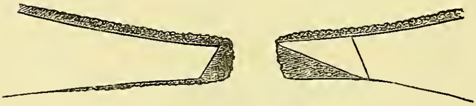


FIG. 363.
THE AMERICAN AND GERMAN METHODS OF PARING THE EDGES OF FISTULÆ CONTRASTED; Sims' is shown on the right, Simon's on the left. The mucous membrane of the bladder is above, that of the vagina is below. The edges may be pared first according to Sims' method, and if a raw surface is not thus obtained the tissue can be removed up to the fine line (*Kaltenbach*).

When a fistula has been discovered during the puerperium, our first aim is to *aid the natural effort at cure.* A catheter (fig. 389) is placed in the urethra to carry off the urine by the natural passage; the vagina is syringed out frequently with warm water; the edges of the fistula may be kept together, in some cases, by tampons suitably placed in the vagina.

If the fistula does not close by the natural process, we have recourse to operation.

Operation for Vesico-vaginal Fistula.

There is difference of opinion as to the *time for operating.* According to Hegar and Kaltenbach, the best time is six to eight *weeks* after the confinement; "the lochial discharge has ceased, the necrosis of the tissues is defined, the margins of the fistula are vascular and juicy and are at the same time of sufficient firmness to hold the sutures;" the cicatricial tissue which forms round the margins makes the operation more difficult afterwards. Marion Sims delays the operation for a few months.

Under the operation, we shall describe—

1. Preparatory treatment;
2. The operation, which consists of (*a*) the paring of the edges of the fistula and (*b*) their adaptation with sutures;
3. After-treatment.

1. *Preparatory treatment* is only necessary when there are cicatricial bands drawing the margins of the fistula apart or contracting the field of operation. These must be divided and made to heal over a glass plug, or the vagina must be kept distended with air-bags. Frequent vaginal injections are necessary in all cases, to bring the edges into as good condition as is possible.

2. For *the operation* itself the following instruments are required

Sims' speculum,
Spatulæ,
Three or four tenacula,
Blunt-hook,
Vaginal douche for permanent irrigation,
Hot water to check hæmorrhage,
Dissecting and artery forceps,
Small bistouries straight or set at an angle—on long handles,
Bozeman's scissors,
Several small sponges and sponge-holders,
Short curved needles and needle-holder,
Curved needles on fixed handles,
Silver wire and wire twister, or Catgut.

Good light is essential and as *complete exposure* of the field of operation as is possible; this last will determine the *position* of the patient, according as Sims' or the lithotomy posture allows us to get more readily at the fistula. The drawing down of the cervix with volsellæ or sutures (fig. 361), or the protrusion of the edges of the fistula by a catheter in the bladder, is of use in some cases; where the mucous membrane of the bladder (by prolapsing through the fistula) comes in the way, it can be kept back by the sound in the bladder or a sponge probang pushed through the fistula (*Sir J. Y. Simpson*).

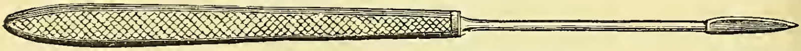


FIG. 364.

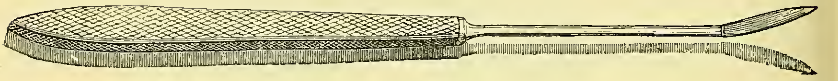


FIG. 365.

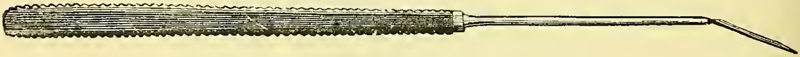


FIG. 366.

KNIVES FOR PARING A FISTULA. Fig. 364, straight knife; fig. 365, bent knife which is shown laterally at fig 366 (*Sir J. Y. Simpson*).

Chloroform is always an advantage, as it gives the operator more freedom in exposing the parts and prevents the patient from moving; the actual pain of the operation does not demand it.

Three *assistants* are needed—one to give chloroform, a second to hold the speculum, a third for the sponges; six are better, as two are required with the patient in the lithotomy posture and there is one to take charge of the instruments. The knives employed are shown at figs. 364–66. The sponges should be very small and fitted on holders of which a convenient form is shown at fig. 367. Fixed *needles* are required when the tissue is dense. Sir J. Y. Simpson used a tubular needle such as that seen at fig. 368, which is sometimes of service.

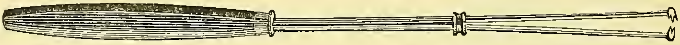
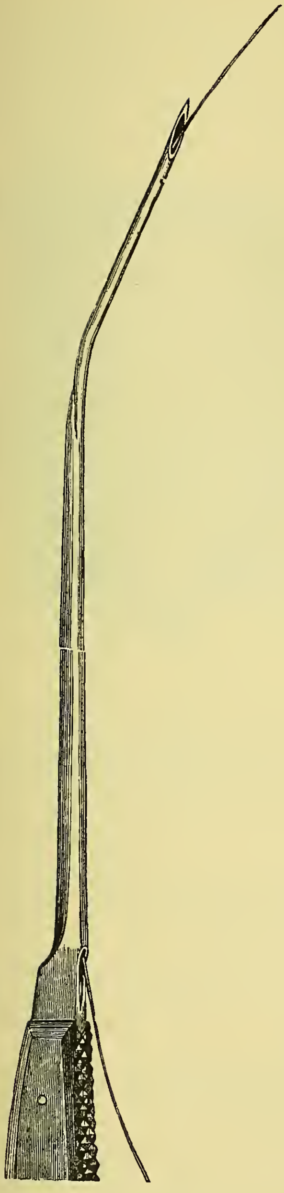


FIG. 367.

SPONGE-HOLDER.

(*a.*) *The paring of the edges of the fistula.* To produce union, it is essential to have a *continuous raw* surface all round the margin. To procure this, we hook up with a tenaculum the portion of vaginal mucous membrane to be removed and transfix it with the knife (*v.* fig. 361 and



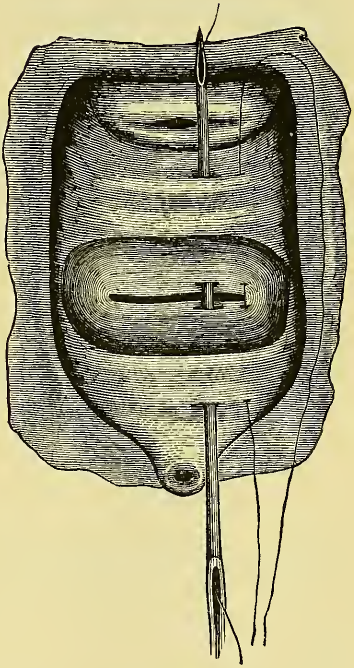


Fig. 369.

Passage of the Thread with the Tubular Needle (*Sir J. Y. Simpson*).

Fig. 368.

Startin's Tubular Needle for Vesico-vaginal Fistula (*Sir J. Y. Simpson*).

fig. 370). The knife should not pass through the mucous membrane of the bladder, unless there be so much cicatricial tissue that a large piece requires to be cut out; the reason for avoiding the vesical mucous membrane is to prevent after-hæmorrhage into the bladder. In small fistulæ, we can remove the tissue in a ring and thus ensure a continuous raw surface; in larger fistulæ, we may take flaps from the adjoining vaginal wall.[1]

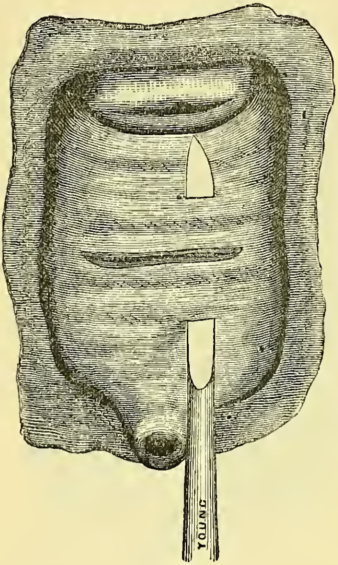


Fig. 370.
Transfixing with a Knife both edges of the Fistula at once (*Sir J. Y. Simpson*).

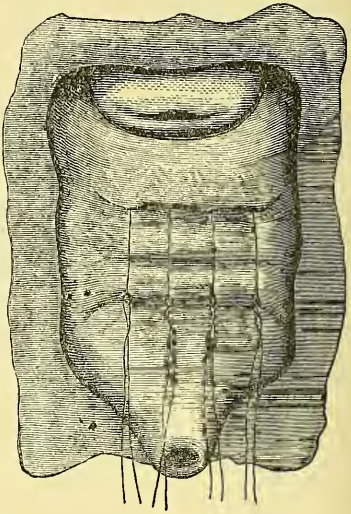


Fig. 371.
Fistula shown at Figs. 369 and 370 closed with Sutures (*Sir J. Y. Simpson*).

Another method of making a raw surface is to split up the edges so that the vesical mucous membrane is separated from that of the vagina; the advantage of this method is that no tissue is lost, but the stitching is less accurate.

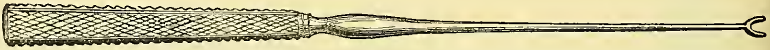


Fig. 372.
Bozeman's Fork, used in drawing through the wires to prevent their cutting the Vaginal Mucous Membrane (*Sir J. Y. Simpson*).

Hæmorrhage is best checked by hot douche; large bleeding points may require twisting or even ligature.

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[1] As W. Duncan has done successfully—*Brit. Med. Journ.* 1887, II., p. 936.

Passage of Sutures.

(*b.*) *The adaptation of the edges with sutures* must be carefully done. If of catgut the sutures may be passed on an ordinary curved needle; if of wire, then a fixed needle (which is made to transfix both margins of the fistula and then threaded), or a hollow needle (fig. 368) may be necessary. To prevent the sutures from cutting the vaginal mucous membrane as they are drawn through, the fork or pulley (figs. 372, 373) can be used. The sutures must be pretty close together and should either not pierce the vesical mucous membrane or should take in only its margin. When the tissues are dense, counter pressure against the point of the needle may be made with a blunt hook as in fig. 374. Sims passes a silk thread first and then uses it to draw through the wire suture.

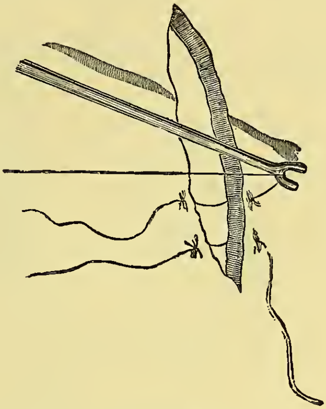

FIG. 373.
METHOD OF USING FORK (*Emmet*).

Counter-pressure in dense tissue.

After all the sutures are passed, they are tied (fig. 376) or twisted (figs. 375, 379); to bring the wires together we can use Bozeman's suture-adjuster (fig. 377); the wire twister (devised by Coghill) is very convenient for twisting the wires close, especially when the fistula

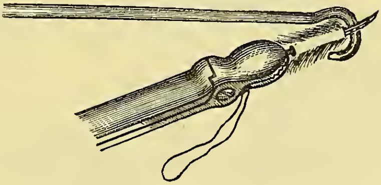

FIG. 374.
MODE OF APPLYING COUNTER-PRESSURE TO THE POINT OF THE NEEDLE BY MEANS OF A BLUNT HOOK (*Emmet*).

Bozeman's method. is deeply placed and not very accessible (fig. 378). Bozeman uses a

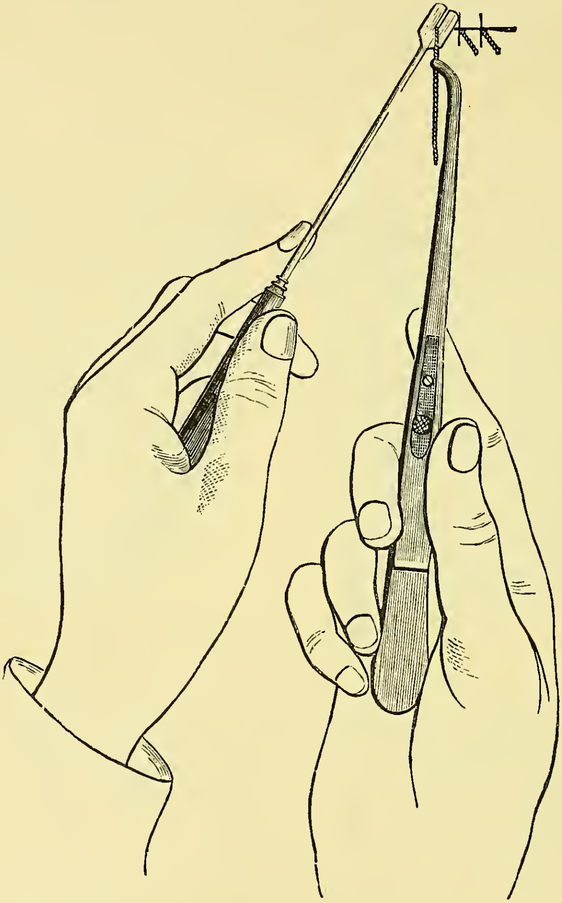

FIG. 375.
SIMS' METHOD OF FIXING AND TWISTING THE SUTURES (*after Sims*).

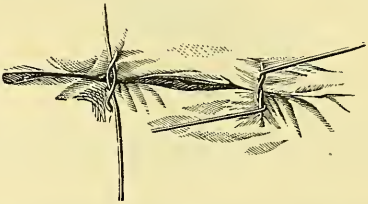

FIG. 376.
MODE OF TYING SILVER-WIRE SUTURES (*Sir J. Y. Simpson*).

plate to fix the sutures. The use of catgut does away with all these appliances. The fistula seen at fig. 369 is shown, after the sutures

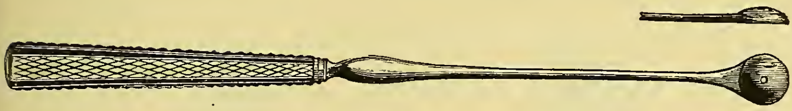

Fig. 377.
Bozeman's Suture-adjuster (*Sir J. Y. Simpson*).

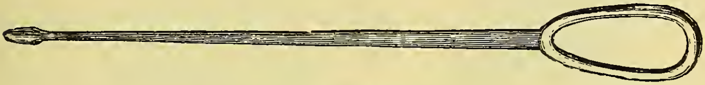

Fig. 378.

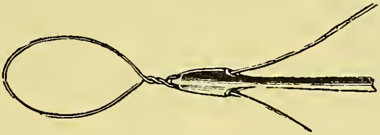

Fig. 379.
Coghill's Wire Twister, fig. 378; its point threaded with a wire is shown at fig. 379 (*Sir J. Y. Simpson*).

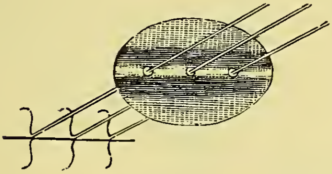

Fig. 380.

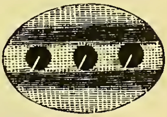

Fig. 381.

Wires drawn through Bozeman's Plate, fig. 380; fixed with shot as in fig. 381 (*Sir J. Y. Simpson*).

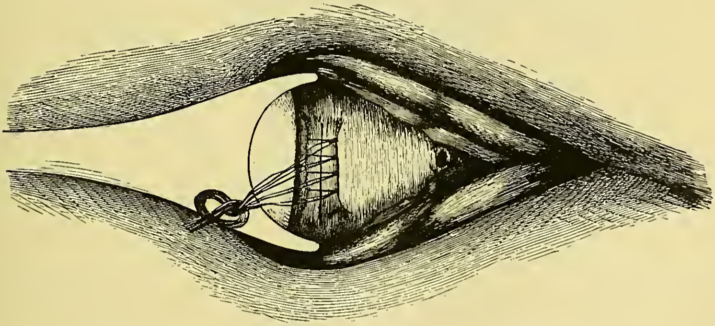

Fig. 382.
Speculum passed for removal of Sutures; the patient is on her side (*Sir J. Y. Simpson*).

have been twisted up, at fig. 371. With a triangular fistula the closed wound will be Y-shaped, while a quadrilateral fistula will give an I-shaped wound (figs. 383, 384).

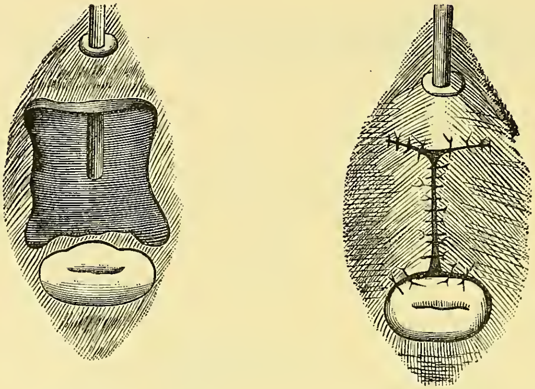

Fig. 383. Fig. 384.

Four-cornered Fistula, fig. 383, closed by Sutures in fig. 384 (*Hegar and Kaltenbach*).

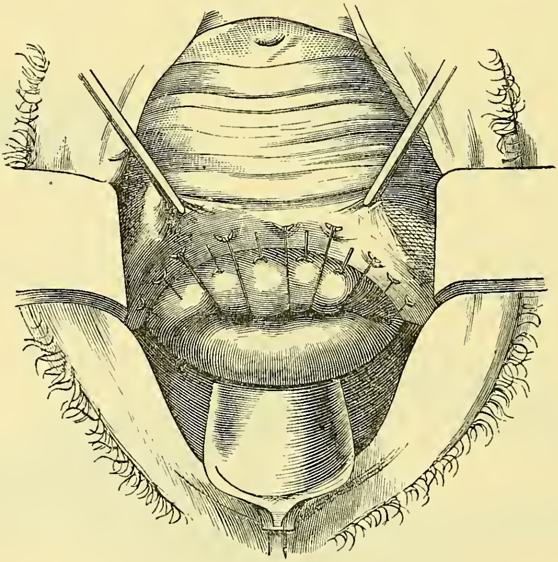

Fig. 385.

Sutures passed through anterior lip of Cervix so as to close in transversely a Fistula of the Anterior Fornix (*H. and K.*).

Fistulæ close to cervix.

In the case of fistulæ situated close to the cervix, we make use of the anterior lip to close the fistula; the result is a crescentic wound (fig.

385). Sometimes we have to excise a portion of the cervix to get a sufficient raw surface (fig. 386). When much of the anterior lip is

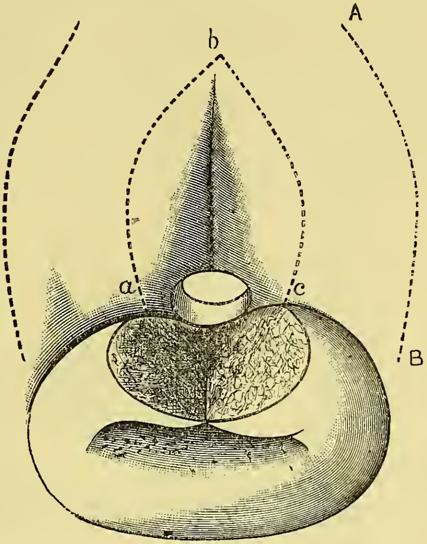

Fig. 386.

Anterior Lip divided to close in vertically a Fistula close to it: *a b c* shows extent of surface, round the oval fistulous opening, to be made raw; the mucous membrane may have to be incised outside the sutures, along the line *A B*, to relieve tension (*Emmet*).

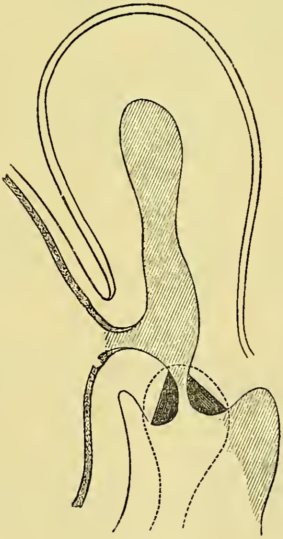

Fig. 387.

Vesico-uterine Fistula. The lips of the cervix are pared, preparatory to stitching up the cervical canal (*H. and K.*).

destroyed, it may be necessary to use the posterior lip to close the fistula (see fig. 358, and compare it with fig. 357); in this case the uterus will communicate with the bladder and the menstrual blood be discharged per urethram. With vesico-uterine fistulæ, two courses are open. If possible, we expose the fistula by splitting the cervix bilaterally[1] and treat it as vesico-vaginal fistula: when this cannot be done, we pare the edges of the os and stitch up the cervical canal; we thus make the uterus open into the bladder (fig. 387).

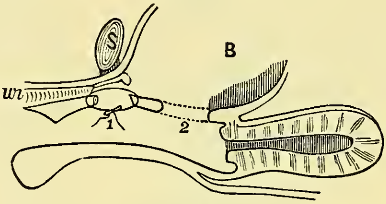

Fig. 388.

Vesical Fistula+Atresia of a portion of the urethra *ur* just below the symphysis *s*. The latter is first bridged over at 1 and then the vesical fistula closed in at 2 (*Winckel*).

When there is a *urethral* as well as a vesical fistula, the *former must be closed first:* when there is *atresia* of the urethra, the free margins of the urethral wall above and below are pared and united by sutures so as to bridge over the atresic portion (fig. 388); the vesical fistula is obliterated by a second operation.

After-Treatment. 3. *After-treatment.* A stationary catheter is placed in the bladder. The form in fig. 389 is the one generally used, the urine being made to drip into a long narrow vessel (as a soap-dish) passed between the

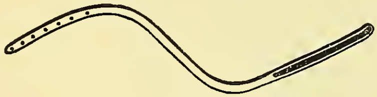

Fig. 389.

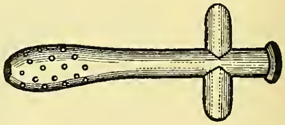

Fig. 390.

Sims' stationary Catheter: fig. 389, first model; fig. 390, newest model. That in fig. 389 is made of block tin so that it can be bent to any curve; when *in situ*, it must be bent so that the external end has its groove uppermost: that in fig. 390 is of rubber and has tubing attached to it.

patient's thighs; two catheters are required, so that they may be changed every day as the salts of the urine readily occlude the tube; the one not in use should be kept thoroughly clean.

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[1] Sänger (*Centralb. f. Gyn.*, XII., S. 377) makes one of the splits extend into and above the fistula, so that the closure of the split closes the fistula also; the sutures are all tied outside the cervix as in Emmet's operation.

Champneys (*Brit. Med. Journ.*, 1888, II., 818) has dissected the bladder off the cervix so as to cut across the fistulous tract, and closed the cut ends separately.

After-dangers of Operation.

The after-dangers of the operation are hæmorrhage into the bladder and vesical catarrh. The former is a troublesome complication, as the blood-clots collect in the bladder; when there is marked hæmorrhage distending the bladder, the fistula must be opened up again. Sometimes the ureter has been caught in a stitch and compressed; intense pain, shooting from the kidney downwards along the course of the ureter, with vomiting and other symptoms of uræmia followed but passed off on relaxing the sutures.

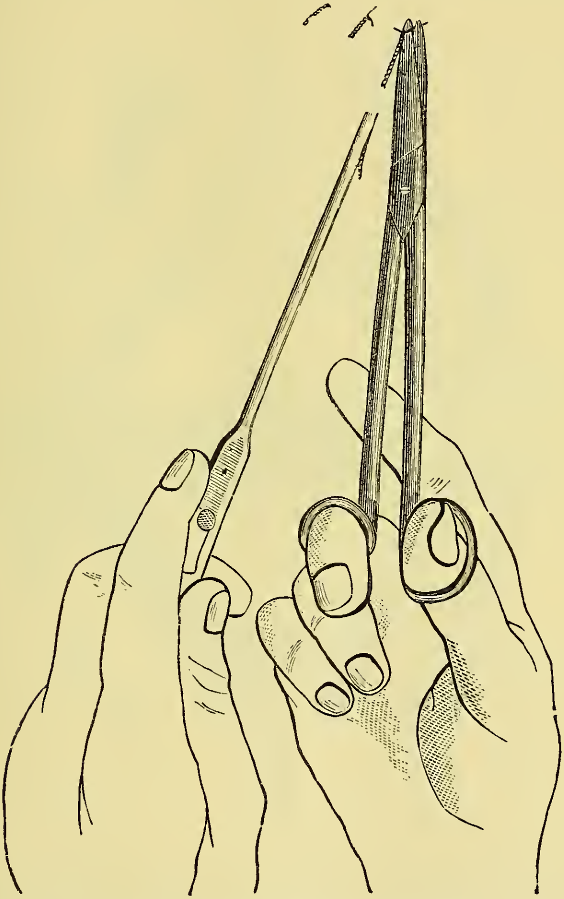

Fig. 391.
Method of Removal of Sutures (*after Sims*).

Removal of Sutures.

The sutures are removed on the tenth day. The method of removing sutures is shown at figs. 382 and 391.

For cases of fistulæ incurable by operation, a rubber urinal fitted into an ordinary ring pessary has been used.[1]

Obliteration of Fistulæ by Cauterisation.

Cauterisation of Fistula.

This treatment is only applicable to very small fistulæ. Cauterisation may be done with nitrate of silver or the red-hot wire. Where the fistula is of any size, cauterisation not only fails to close it but converts its margins into cicatricial tissue; this makes its subsequent closure

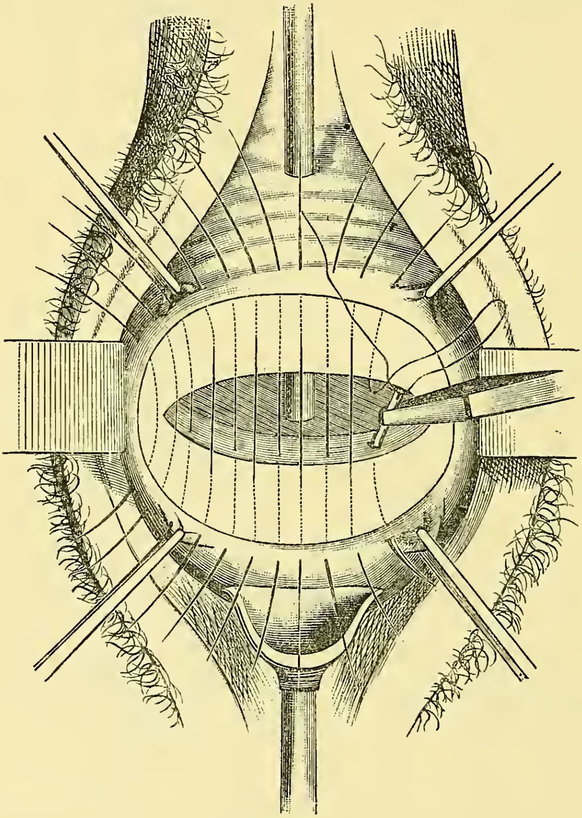

FIG. 392.

SIMON'S OPERATION FOR KOLPOKLEISIS. The patient is in the lithotomy posture; the sound has been passed through the urethra and fistula, and is seen in the upper portion of the vagina; the perineum is drawn back with the speculum and the labia majora with spatulæ. A band-like piece of tissue has been removed from both the vaginal walls above the ostium; the raw surface is left unshaded in the figure. The vaginal mucous membrane is held tense by four pairs of forceps outside the raw surface, the shaded area within the latter is the upper third of the vagina. An end of the last suture has been passed through one raw surface, the second end is being carried through the other raw surface (*H. and K.*).

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[1] By Jay—*Amer. Journ. Obstet.*, 1887, p. 50.

with sutures more difficult. This method of treatment, even in the case of larger fistulæ, has been recently revived and advocated by Bouqué,[1] whose writings may be consulted.

For ureteric fistulæ, nephrectomy has been performed successfully by Gusserow and Josephson.

Closure of the Vagina: Kolpokleisis.

Where direct closure of the fistula is impossible, the only means for relieving the patient's discomfort is closure of the vagina below the fistulous opening. The portion of the vagina above this becomes, as it were, an extension of the bladder; the menstrual blood is discharged with the urine.

Vidal de Cassis, who originated this operation, performed it as follows. The inner surfaces of the labia majora were pared and brought together by sutures: the vulva was thus closed in an *antero-posterior* direction. After this operation, there always remained just below the urethral orifice a small cleft through which the urine trickled. Unless complete continence is obtained, such an operation is useless.

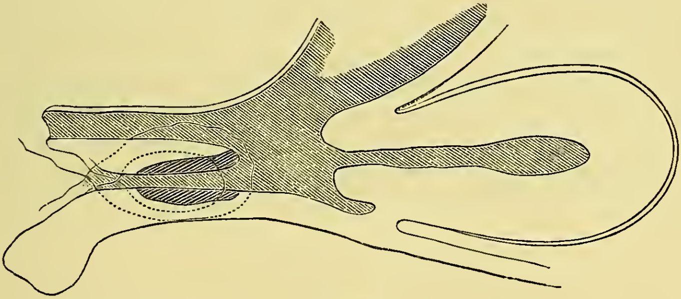

FIG. 393.

SAME OPERATION AS SEEN IN SECTION TO SHOW RELATION OF RAW SURFACES (shaded dark), position of sutures and common receptacle above for urine and menstrual blood. The bladder and urethra are in upper part of figure (*H. and K.*).

Simon's Kolpokleisis.

Kolpokleisis is the name given to the operation introduced by Simon. It consists in obliteration of the vagina *transversely* by making a raw surface on its walls above the level of the ostium vaginæ. It is evident that this operation is justifiable only where closure of a fistula is impossible, either through the binding down of its margins to the bone with cicatricial tissue or through the complete destruction of the urethra. As the closure of the vagina interferes with married life, the nature of the operation should be explained to the patient beforehand and full permission obtained.

The operation is performed as follows. By pinching up the mucous membrane, ascertain where it is most lax, so that the vaginal walls can be easily approximated; the point of closure should be as high up as possible. Mark out with the knife the ring of tissue to be excised. Lay hold of its lower margin and dissect it from below upwards; with the finger in the rectum and the sound in the urethra, we can judge of the thickness of tissue to be removed (compare fig. 392 with fig. 393). On each ligature of wire or carbolised silk, two small curved needles are threaded so that *both* ends of the thread may be passed *from above downwards.* The needle must be entered into the vaginal mucous membrane above, carried through the substance of the vaginal wall (without appearing in the wound), and brought out through the vaginal mucous membrane below; it is difficult to prevent these sutures from catching up either bladder or rectum but this should, if possible, be avoided. Care is required in the introduction of the first mesial suture as it is the guide for the others.

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[1] "Du Traitement des Fistules uro-gén.; par la réunion secondaire:" Paris, 1875.

The results of this method are satisfactory as regards the production of complete continence. There is no liability to stagnation of urine or formation of concretions (*Hegar and Kaltenbach*). Hæmatometra will not occur unless there has been atresia of the cervix uteri. If menstruation has been in abeyance, it will probably return after the operation; in a case operated on by A. R. Simpson, the patient had not menstruated for a year, but a few weeks after the operation the menstrual blood appeared in the urine.

CHAPTER LV.

THE RECTUM: COCCYGODYNIA.

LITERATURE.

Allingham—Diseases of the Rectum: Churchill, 1871. *Chadwick*—On the Functions of the Anal Sphincters: Am. Gyn. Trans., 1877. *Cripps*—Cancer of the Rectum: Churchill, 1880. *Hart*—Physics of the Rectum and Bladder: Edin. Obst. Trans., 1882. *Ruedinger*—Topographisch-chirurgische Anatomie des Menschen, vierte Abtheilung: Stuttgart, 1873. *Storer*—The Rectum in its relation to Uterine Disease: Am. Jour. of Obst., Vol. I., p. 66. *Syme*—Diseases of the Rectum: Edin. 1859. *Van Buren*—Diseases of the Rectum: H. K. Lewis, 1881. For recent literature see Index in Appendix.

Not only is the gynecologist frequently consulted about rectal mischief, but as a matter of fact female patients sometimes refer rectal disease to the uterus or vagina; therefore, in investigating gynecological cases, one has occasionally to satisfy one's self that the rectum is not the seat of the affection.

Vaginismus may be caused by fissure of the anus, as we have already seen, and pruritus vulvæ by ascarides from the rectum passing into the vagina.

PHYSIOLOGY OF THE RECTUM.

Relation of Rectal, Vaginal, and Urethral Axes.

The anatomy of the rectum has been already considered (p. 36). The relations of the axes of rectum, anus, vagina and urethra, to one another and to intra-abdominal pressure are of importance. As we have already seen, the vagina and urethra are parallel to one another and to the plane of the brim.

Strictly speaking the surface whose outer boundary is the brim of the bony pelvis is not a plane surface, inasmuch as the various points in the outline of the brim are not on the same level. The vagina is thus, properly speaking, parallel to the internal conjugate of the brim.

The rectum runs, in part of its course, close behind the vagina for $1\frac{1}{2}$ inches and parallel to it; the anal canal turns directly backwards so as to cut the vaginal axis at right angles. Intra-abdominal pressure acts at right angles to the vaginal walls, as can be noted from the fact that in defæcation the Hodge pessary is not driven out of the vagina. Consideration of fig 394 will show that the direction of intra-abdominal pressure on the pelvic floor coincides with the long axis of the anus, so that intra-abdominal pressure will act with its full driving force on any body in the anal canal.

Mechanism of Defæcation.

The mechanism of defæcation is probably the following. According to Hilton, in his now classical book on "Rest and Pain," the lower part of the rectum is sensitive but the upper two-thirds are but slightly so; the rest of the large intestine and the small intestine are non-sensitive. Hilton limits the sensitive portion to the lowest two inches of the rectum—to the part below the so-called sphincter tertius. When there is accumulation of fæcal matter in this portion, pain and uneasiness produce the desire to expel these contents. There result the following reflex movements :—

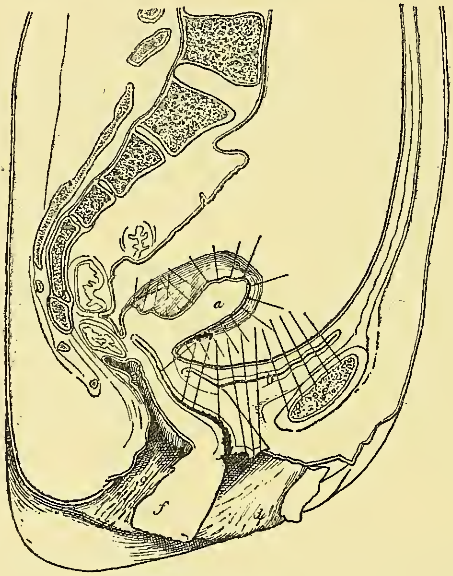

Fig. 394.

To show direction of Rectum and of Anus in relation to Intra-abdominal Pressure. *a* uterus, *b* bladder, *d* vaginal orifice, *f* perineum.

(1) Relaxation of the sphincter ani;
(2) Peristaltic contraction of the circular unstriped muscle;
(3) Shortening of the longitudinal muscle with eversion of the mucous membrane. Since the longitudinal fibres have a fixed point below, their contraction will probably pull the rectum more into the line of the anal axis;
(4) Contraction of the segments of the sphincter tertius.

In this way the lowest portion of the rectum becomes roofed in above by the sphincter tertius and open below. Intra-abdominal pressure drives this portion downwards; and the rectal contents, elongated by peristalsis and depressed by intra-abdominal pressure and eversion of the mucous membrane, are finally brought into the relaxed anal canal from which intra-abdominal pressure readily expels them. Ruedinger's diagram (fig. 35) shows well how the Levator ani will reinvert the everted mucous membrane.

Inattention to the proper evacuation of the bowels leads to non-sensitiveness of the mucous membrane and is thus one factor in constipation.

EXAMINATION OF THE RECTUM.

This may be done in three ways:

(*a*) By finger (*v.* p. 101),
(*b*) By speculum,
(*c*) By eversion of the anterior rectal wall through digital pressure in the vagina (*Storer*).

Specular Examination of Rectum.

By Speculum. The anal speculum has usually an oval fenestra; it is passed into the anus in the direction of its long axis, and rotated so that each portion of the anal lining comes opposite the aperture (fig. 396).

Storer's Method.

Storer's method is as follows. Place the patient on her side; pass two fingers (or one) half way into the vagina, with the pulps of the fingers on the posterior vaginal wall. Then press these downwards and backwards, and thus evert the rectal mucous membrane through the dilatable sphincter ani which is at the same time pressed open with the fingers of the other hand. This method is most easily employed in multiparæ.

DISEASES OF THE RECTUM.

Women are especially liable to rectal disease from the distension of parts accompanying parturition, as well as from their habitual neglect of the regular evacuation of the bowels. As rectal diseases often simulate those of the vagina, a sketch of the more important of them is necessary in a Manual of Gynecology. We shall therefore consider the following affections:—

Displacements of the rectum,
Fissure of the anus,
Piles,
Recto-vaginal fistula;
Functional disturbance of Rectum—Constipation.

Displacements of the Rectum.

These are—Rectocele;
Prolapsus Recti (*a*) of mucous membrane,
(*b*) of whole thickness of bowel.

Prolapsus Recti.

For *Prolapsus Recti,* which is properly surgical, see Van Buren or Allingham.

Rectocele.

Rectocele is a protrusion of the lower part of the anterior wall of the rectum covered by the posterior vaginal wall, into the lumen of the vagina or even through the vaginal orifice. *Etiology.* There are two factors—tear of perineal body and pressure of scybala in rectum. *Diagnosis.* The posterior vaginal wall is seen protruding into the vagina or out at the vaginal orifice. The diagnosis is made by noting the relations of the protruded vaginal wall and by passing the finger through the anus into the pouch (fig. 395). *Treatment.* The patient should wear in the vagina a Hodge or Albert Smith pessary with cross bars; explain the necessity of a regular daily evacuation of the bowels.

Fissure of the Anus.

Fissure of Anus.

This is a crack, or ulceration, of the anal skin or of the mucous membrane covering the internal sphincter. In the edges of the crack there is usually a nerve filament, and below the crack lies the powerful sphincter ani.

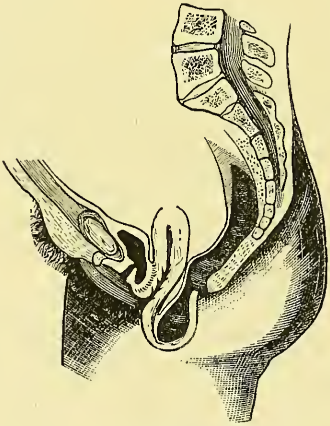

Fig. 395.
Rectocele (*Schroeder*).

This apparently insignificant lesion gives rise in most cases to an unbearable and even incredible amount of pain, lasting for hours after the bowels have moved. Hilton's explanation of this is so good that we give it entire.

Hilton's explanation of pain in Fissure.

"The reason for this anal ulcer being so very painful is the number of nerves associated with it; and the cause of the continued painful contraction which accompanies it lies in the enduring strength of the sphincter muscle. Thus it happens that exposure of those nervous sensory filaments upon the ulcer causes excito-motory or involuntary and spasmodic contraction of the sphincter, through the medium of the spinal marrow. The sphincter muscle contracts towards its own centre, and, as long as the muscle is in a state of contraction, it brings the sensitive edges of the ulcer into forced contact; this excites more muscular contraction, and thus, by time and exercise, the muscle becomes hypertrophied, massive, and increased in dimensions."

Symptoms.

Symptoms. The patient complains not so much of pain while the bowels are being moved as *of an unbearable pain coming on after the evacuation and continuing for some hours.* The pain is described as unendurable, causing the patient to dread and postpone natural motions. There are often iliac pains and vaginismus; this last symptom is not infrequent.

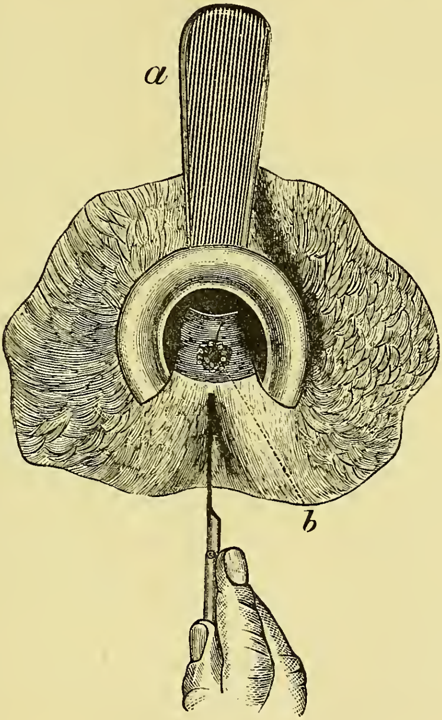

FIG. 396.
ANUS *a* WITH ANAL SPECULUM *in situ;* it is turned so as to expose in the fenestra a fissure *b* beneath which a tenotomy knife has been passed (*Hilton*).

Physical signs. By speculum or eversion, the crack is seen.

Treatment.

Treatment. Chloroform the patient, pass a tenotomy knife beneath the base of the ulcer (fig. 396) and cut upwards. This divides the muscular fibre so that the irritated edges can no longer be brought together. The fissure gets rest and heals readily; a cure is thus effected.

Another and very good plan is to chloroform the patient, and introducing the thumbs (with the dorsal surfaces in contact) to stretch the anus by forcibly separating them; this ruptures the muscular fibre and acts just as the knife does, and is especially good when the fissures are multiple.

The bowels are not to be moved for a day or two; the patient has then some pain when the motion is passing, but none after it.

Piles.

Hilton has pointed out that at the anus the line of demarcation between skin and mucous membrane is marked out distinctly by "the white line," as he terms it. This line is of great practical importance, as we shall see.

Piles are small tumours at the anus, on either side of this white line. They consist of dilated veins embedded in connective tissue and covered by skin or mucous membrane. We speak of external piles, *i.e.*, those outside of the white line and covered by skin, and internal piles, *i.e.*, those inside of the white line and covered by mucous membrane. Occasionally we have, as a special form of external pile, a dilated vein outside of the white line and usually containing a clot (venous pile).

Symptoms. *Symptoms.* Venous piles cause great pain; while external piles, unless inflamed, occasion little inconvenience; from internal piles, there is bleeding when the bowels are moved.

Signs. *Physical signs.* The venous pile is a purplish tumour outside of the white line; external piles are like tags of skin, or are more or less distended; internal piles are cherry-red and easily bleed.

Treatment. *Treatment.* 1. When venous piles contain a clot, incise and turn out clot.

2. For internal piles, employ the following *palliative* treatment. Give sulphur confection when necessary.

℞ Confectionis Sulphuris ℥ij.
Sig. Dessertspoonful at night.

Order gall and opium ointment to be applied.

℞ Unguenti Gallæ c̄ Opio ℥ij.
Sig. As directed.

For any abrasions, order iodoform ointment (p. 532) or Bismuth and Cocaine suppositories.

The *radical* operative treatment belongs more to the surgeon.

Recto-vaginal Fistula.

The situation of such a fistula is shown in fig. 356. It may be due to carcinomatous or syphilitic ulceration, or to injury received during parturition. The last only can be operated on. It is usually due to a tear, during labour, involving the anus and where the lower part of the laceration has united. The best treatment is to cut through the united portion and operate on it as if it were rupture of the perineum involving the anus.

Functional disturbance of Rectum—Constipation.

Women are usually exceedingly careless in the matter of regulation of the bowels; very often, evacuation is practised once a week or even at longer intervals. This is in many respects not their fault but is due to insufficient water-closet accommodation, to modesty, and to the fact that evacuation is for evident reasons postponed during menstruation.

When consulted for constipation, the medical man should insist on the value of a daily evacuation at a fixed hour; this educates the bowels to demand it regularly. All quack pills should be tabooed as dangerous. The diet should be regulated; bran-bread, porridge and milk, stewed fruit, figs, etc., taken as part of food. The following pill is good.

℞	Extracti Nucis Vomicæ	
	Extracti Belladonnæ	āā gr. $\frac{1}{4}$
	Pilulæ Colocynthidis et Hyoscyami	,, iij.
	Fiat pilula : mitte tales vj.	
	Sig. One occasionally.	

The nux vomica and belladonna strengthen the peristalsis of the bowel: the colocynth and hyoscyamus pill is purgative; aloes and iron pill may be substituted for it.

The American drug Cascara is very useful. We may give a pill of three grains thrice daily until the bowels move; twenty drops of the liquid extract may be taken instead.

℞	Extracti Cascaræ Sagradæ	gr. iii.
	Pulv. Glycyrrh Co.	q.s.
	Fiat pilula: mitte tales xij.	
	Sig. One thrice daily.	
℞	Extracti Cascaræ Sagradæ Liquidi	ʒij.
	Sig. Twenty drops thrice daily.	

This drug is tonic to the bowels: its use should be stopped when once the bowels begin to act. It should not be given until the diet is regulated. The pill is more convenient, as the liquid extract is bitter.

The purgative mineral waters are very useful. The best are the Friedrichshall, Hunyadi Janos and Aesculap. The patient should take in the morning a wine-glassful or half-tumblerful with an equal amount of hot water; the taste may be masked by the juice of a lemon with sugar. The Carlsbad salts are good and may be used as already directed (p. 340). Very often an enema of cold water is helpful. The medical man should deprecate the habitual use of purgatives, and insist on natural and daily evacuation.

The aloes and iron pill is good in sluggishness of the lower bowel. Rhubarb is bad as a habitual purgative, owing to its tendency to constipate after purging; the well-known "Gregory's Mixture" should not be used as a habitual purgative, but is good in diarrhœa inasmuch as it first purges and then binds. Fluid magnesia, castor oil, and some of the milder salines (*e.g.*, the easily-taken Seidlitz powder) may be employed. Blue pill should be avoided; Euonymin or Iridin are better hepatic stimulants (*v.* p. 584).

It has been recently found that the injection of pure glycerine (ʒj–℥j) into the rectum ensures an evacuation of the lower bowel in a few minutes. It is therefore convenient in certain cases. Suppositories made up in large part of glycerine can also be employed. A small syringe is required for the injection of the fluid glycerine.

COCCYGODYNIA.

LITERATURE. *Hildebrandt*—Die Krankheiten der äusseren weiblichen Genitalien, S. 127: Stuttgart, 1877. *Nott*—N. O. Medical Journal, May 1844. *Simpson, Sir J. Y.*—Diseases of Women, p. 202: Edinburgh, 1872. *Thomas*—Diseases of Woman, p. 151: London, 1880. For recent literature see "Miscellaneous" in Index of Literature in the Appendix.

By this we understand a painful condition in the region of the coccyx induced by sitting, walking, and the various muscular contractions associated with defæcation and coitus. When we consider the anatomy of the coccyx, its muscular attachments (to the levator ani, coccygeus, external sphincter ani, and gluteal muscles), as well as the strain put on it when driven back during parturition, we are not astonished that in some cases there should be inflammatory changes around and in it causing pain in its movement.

Symptoms. The chief symptom is pain on sitting, walking, and defæcation.

Physical signs. By digital pressure on the coccyx and examination per rectum, the seat and nature of the pains are made out.

Treatment. (1) Massage and manipulation of the coccyx should be tried first. (2) Pass a tenotomy knife beneath the skin on the posterior aspect of the coccyx, and free its lateral and apical muscular attachments; or (3) amputate the coccyx. To do the latter, make a vertical mesial incision over the posterior aspect of the coccyx; seize its tip and pull it well back; then free its muscular attachments with the knife, keeping close to the bone; finally separate it at the sacro-coccygeal joint.

APPENDIX.

ABDOMINAL SECTION.

LITERATURE.

Barbour—The Diagnosis of Advanced Extra-uterine Gestation : Ed. Med. Journ., 1882. *Hart*—The Minute Anatomy of the Placenta in Extra-uterine Gestation : Ed. Med. Journ., Oct. 1889. *Hart and Carter*—The Sectional Anatomy of Advanced Extra-uterine Gestation: Edin. Med. Journ., Oct. 1887. And Laboratory Reports, R.C.P.E. : Edin., 1889. *Jessop*—Case of Extra-uterine Gestation ; removal of living fœtus, etc. : Lond. Obstet. Trans., 1876, p. 261. *Keith*—Surgical Treatment of Tumours of the Abdomen : Edin. 1885. *Langenbuch*—International Medical Congress, London, 1881, Vol. II., p. 278. *Lister*—On Corrosive Sublimate as a Surgical Dressing : Lancet, 1884, p. 723. *Macdonald*—Record of Cases treated in Ward XXVIII., Royal Infirmary, Edinburgh, Nov. 1883 to April 1884: Edin. Obstet. Trans., vol. IX., p. 134 ; same from May to November 1884 : ibid. X., p. 178. *Maygrier*—Terminaison et Traitement de la Grossesse extra-uterine : Paris, 1886. *Morris*—Surgical Diseases of the Kidney : London, Cassell & Co., 1885. *Tait, Lawson*—Diseases of the Ovaries : Birmingham, Cornish Brothers, 1883. Ectopic Pregnancy and Pelvic Hæmatocele : Birmingham, 1888. The Pathology and Treatment of Extra-uterine Gestation : Brit. Med. Journ., 1884, p. 317. *Thornton, J. Knowsley*—Cases of Hysterectomy, etc. : Brit. Med. Journ., May 23, 1885. *Treves, F.*—Intestinal Obstruction : London, Cassell & Co., 1884. *Wells, Sir Spencer*—The Diagnosis of Surgical Treatment of Abdominal Tumours : London, Churchill, 1885. See also Literature of Operative Treatment of Ovarian Tumours, Chap. XXIV., and Treatment of Fibroid Tumours, Chap. XXXVII. ; all references to recent papers will be found under "Abdominal Surgery," in the Index in Appendix.

In this chapter a short summary will be given on this important subject. In the preceding pages operations necessitating abdominal section, *viz.* those for abdominal and pelvic tumours, have been described ; but this chapter is intended to gather up consecutively and briefly the main points necessary for the successful performance of Abdominal Section so as to give the operator or his assistant a bird's eye view of the whole subject and enable him to meet unexpected emergencies such as often arise even after the utmost care has been taken to avoid mistakes in diagnosis.

Preliminaries. The operation is best performed in the special wards of an hospital or in a private hospital in the case of well-to-do patients. The houses of the poor are quite unfitted for operations ; and it is much better for wealthy patients to be under the discipline of a good private hospital and away from the well-meaning but hurtful interference of relatives. It also relieves the operator of the anxieties attendant on their misinterpretation of symptoms.

Prior to any operation the patient's systems should be examined, especially lungs, heart, and kidneys. Ether is better not employed when there is a tendency to bronchitis: and the amount of urine should be noted, the usual tests for albumen and sugar employed, and microscopical examination made of its deposit. The urine is sometimes scanty in cases of large tumours, and therefore some diuretic such as acetate or citrate of potash should be given.

The pulse and temperature should also be taken twice daily for a few days prior to operation.

The importance of having a specially trained nurse cannot be overrated. She is required to take the pulse and temperature, and to keep a register of these: to draw off the urine when necessary and to be capable of giving ordinary and nutritive enemata. She must therefore have good hands, be firm and yet gentle, one who carries out instructions to the letter, and who is thoroughly imbued with the spirit of cleanliness.

ANTISEPTICS.

The operation is to be carried out in the spirit of Listerism. The operator strives to have pure surroundings and everything that touches the part operated on aseptic, either by antiseptics or sterilisation. He must therefore consider means of purifying the *air*, *instruments*, *sponges*, *skin of patient adjacent to part operated on*, *and discharges from wounds.*

Purification of the air. This is to be got by ventilation, previous purification of the room by sulphur or chlorine fumigation, and preliminary spraying of carbolic lotion into the air of the apartment. The spray need not be used during the operation as it may have an injurious effect on the tissues and peritoneum. The operator's great aim is to lower the health of the tissues as little as possible and not to irritate the peritoneum nor hinder its absorptive power. He is to attach the greatest importance to the absolute asepticity of everything that touches the wound—fingers, knives, and (above all) sponges.

Instruments are readily purified either by boiling water or by soaking in carbolic lotion (1-20 of water). During the operation they should lie in shallow porcelain trays of 1-40 carbolic lotion.

Sponges. This is the part of the operative equipment which requires most careful attention. The utmost cleanliness and purification of sponges is a *sine quâ non* to success. Care must be taken that they do not become friable and the operator should give them his personal attention.

As an exemplar of what is required, we give Lawson Tait's precautions in regard to them.

Mode of cleaning sponges.

"New Sponges are first put into a large quantity of water with sufficient muriatic acid to make the water taste disagreeably acid. They remain in this mixture until all effervescence has ceased and all the chalk is removed. For this purpose it may be necessary to renew the acid several times. The Sponges are afterwards carefully and thoroughly washed to make them as clean as possible and free from every rough particle. After being used at an operation they are first washed free from blood, and then put in a deep jar and covered with soda and water (1 lb. of soda to twelve sponges). They are left in this about twenty-four hours (or longer if the sponges are very dirty), and then they are washed perfectly free from every trace of soda. This takes several hours' hard work, using hot water, squeezing the sponges in and out of the water, and changing the water constantly. Leaving them to soak occasionally for a few hours in very hot water greatly assists in the cleansing. When quite clean they are put into a jar of fresh water containing about one per cent. of carbolic acid, and after being in this for twenty-four hours they are squeezed dry and tied up in a white cotton bag, in which they are left hanging from the kitchen ceiling (being the driest place in the house) till they are wanted."

Prior to an operation they should be carefully washed in very hot water and soaked over night in carbolic lotion (1-20).

They are wrung out of 1-40 for the operation and placed near the operator in a suitably warmed dish.

The skin near the part to be operated on should be washed the night before the operation with turpentine, soap, and water. The umbilicus is to be carefully cleansed. When the patient is under chloroform, the skin is again washed with corrosive sublimate (1-2000) and the pubes shaved.

The operator's hands are to be cleansed with turpentine, soap, and water: the nails brushed, and all finally washed with corrosive sublimate (1-2000). One good rule is that only the operator or the special assistant should touch the wound, sponges, and instruments. No one else should do so unasked.

THE ABDOMINAL INCISION.

This is either *mesial* or *lateral.* The *mesial* incision is the usual one and may vary in length.

For an exploratory incision, two inches is sufficient, and this is also, as a rule, enough for the removal of the uterine appendages in the pelvis. Its lower end is one inch above the symphysis pubis but must be higher when removing the uterine appendages in an abdominal fibroid.

For ovariotomy, an incision of 3 to 4 inches in length is usually required.

For large solid tumours, the incision may be very long.

If the first incision into the abdominal cavity is found too short, it can easily be enlarged up and down with straight probe-pointed scissors guided on the finger passed in.

The operator cuts down through the skin and abdominal fat to the aponeurosis. Beneath the aponeurosis is the extra-peritoneal fat and then the peritoneum. A good plan is to lay hold of the structures beneath the aponeurosis with two pairs of Péan's forceps, each one catching a little to the side of the mesial line. In this way a fold is pinched up, running across the middle line at right angles to it: this can be cut without danger to subjacent structures and the same manœuvre repeated on deeper structures.

The *lateral incision* of Langenbuch is to be recommended in renal tumours. It is made at the outer margin of the rectus abdominis with its centre at the level of the umbilicus and is advantageous inasmuch as the operator reaches the outer layer of the meso-colon, thus avoiding the blood-vessels running in the inner layer.

EXPLORATION OF ABDOMEN OR PELVIS AND REMOVAL OF TUMOURS.

When the abdominal cavity is opened the operater either explores in doubtful cases or removes the tumour he has already diagnosed.

While exploring, the deep anæsthetization of the patient removes all straining of the abdominal muscles. The operator may find that he has to deal with a malignant case, or with a tumour not removable. He must then close the incision. One good rule in doubtful cases is not to meddle unless there is a fair chance of finishing the case. It is always unwise for the operator, and highly dangerous to the patient, to nibble, as it were, at a case. There is little or no risk in mere exploratory incision.

The removable tumours or conditions admitting treatment are—

Abdominal.

(1) Ovarian, parovarian, and broad-ligament tumours,
(2) Fibroid,
(3) Fibro-cystic,
(4) Splenic,
(5) Omental,
(6) Renal,
(7) Hydatid,
(8) Mesenteric,
(9) Pancreatic,
(10) Distended gall bladder,
(11) Uterine appendages in cases of fibroids,

Pelvic.

(12) Uterine appendages diseased (pyosalpinx, cirrhotic or prolapsed and painful ovaries),
(13) Pelvic abscess,
(14) Extra-uterine gestation.

(1) *Ovarian, parovarian, etc.* The removal of these by Abdominal Section has already been fully described under Ovariotomy, in Chap. XXIV. The operation for a *pediculated* tumour may thus be briefly summarised. The operator taps the tumour, withdraws it from the abdomen

and ties the pedicle with the Staffordshire or the ordinary knot. In certain cases or in all (*Keith*) the clamp and cautery can be employed. The tumour is now cut away: the pedicle whether ligatured or cauterized is dropped back (complete intra-peritoneal treatment) and the abdominal incision closed.

When the tumour (usually papillomatous) has developed between the layers of the broad ligament or beneath the peritoneum and is *not pediculated*, its removal is a much more difficult matter. The best plan is to tap first, then to incise the peritoneum and enucleate the tumour. The part first enucleated with the finger is laid hold of with forceps, drawn well up, and then the operator separates further with his finger, seizing bleeding points with Péan's forceps and tying with catgut. Care must be taken at the side walls of the pelvis not to damage the ureter, as well as at the region of the sacro-iliac joints where the large iliac veins with their many branches lie. The part from which the tumour has been enucleated should be drained if necessary.

Removable Abdominal Tumours.

(2) (3) *Fibroid and Fibro-cystic.* For full details of Hysterectomy for Fibroids, see pp. 432–442. The tumour is turned out of the abdomen through a large incision, clamped, and then cut off. The pedicle is usually treated extra-peritoneally.

(4) *Splenic.* Cystic splenic tumours have been removed successfully. In Leucocythæmic cases the spleen should not be removed.

(6) *Renal.* After incising the abdominal walls by Langenbuch's incision,[1] the outer layer of the meso-colon is opened, the renal vessels secured, and if tied separately, the artery is to be tied first. The ureter is grasped with two ovariotomy forceps and divided between. The tumour is now enucleated, the vessels cut on the tumour side of the ligature and the tumour removed.

The ureter is now tied and its end secured in the abdominal incision.

(7) (8) *Hydatids or Mesenteric tumours* are opened, the contents evacuated, and the incision into them stitched to the abdominal wound.

(10) *Distended gall bladder.* The gall bladder when distended owing to obstruction by gall stones, has been opened, the calculi removed (recommended by Jean Louis Petit, Handfeld Jones, and carried into execution by Marion Sims, and especially Lawson Tait). Tait, in one of his cases, made an incision 4 inches in length, in the middle line, with the umbilicus in the centre of the incision. The gall bladder was aspirated after the abdomen was opened, and then cut into at that point; the gall stones were extracted, the opening in the gall bladder stitched to the abdominal wound, and the rest of the wound closed in the usual

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[1] On this subject the student may read Morris' Surgical Diseases of the Kidney (London 1885), and also Czerny's paper "Ueber Nierenextirpation," with discussion in the International Congress Transactions; London 1880, Vol. II., p. 242.

[2] See specially Lawson Tait's article.

way. Bile oozed from the wound for some days, but the patient made an excellent recovery.

(11) *Uterine appendages in case of Fibroids.* When a fibroid is not too large and is growing rapidly or causing exhausting hæmorrhages, the appendages should be removed. A two-inch incision is made through the abdominal wall and the ovary and Fallopian tube on either side brought up to it. The ovary and part of the Fallopian tube are looped up, tied with the ordinary or the Staffordshire knot, and the parts outside the ligature cut off. In this way the ovary and part of tube are removed.

(12) *Uterine appendages diseased (pyosalpinx, cirrhotic or prolapsed and painful ovaries).* The uterine appendages when diseased and causing serious indisposition may be removed. This is not by any means to be done lightly, its exact results as to sterility have to be explained, and the operator should never force it on the patient.

In *Pyosalpinx* the operator first taps, then loops up the tube, freeing adhesions with his fingers, ligatures as large a loop as possible and cuts away above. Great care is to be taken to prevent any pus entering the abdomen. This is best done by pressing sponges below the freed tube. Any hæmorrhage is arrested by pressure, ligature, hot water, or by the actual cautery. Some operators prefer to separate adhesions before tapping. Should the tube rupture during this, the extravasated contents must be most carefully sponged out and the pelvis thoroughly flushed with hot water.

(13) *Pelvic abscess* may be treated by abdominal section when it rises up so as to be near the abdominal walls. After the usual incision through the walls, the operator taps the swelling, then draws up the collapsed walls of the cavity, enlarges the opening, and stitches it with silk to the abdominal wall, the rest of the abdominal incision being closed as usual. A glass drainage tube is passed into the abscess cavity, but the peritoneal cavity is accurately closed.

Forms of Extra-Uterine Gestation.

(14) *Extra-uterine gestation* may be met with in very many forms:—

Early.

(*a*) Entire, small, and still in Fallopian tube;
(*b*) Ruptured into the peritoneal cavity, which contains much blood and a small fœtus;
(*c*) Ruptured through the part of the Fallopian tube bounded by the broad ligament, and developing there;

Advanced.

(*d*) Both fœtus and placenta near full time but lying in extra-peritoneal tissue;
(*e*) Fœtus in peritoneal cavity with placenta in extraperitoneal tissue;
(*f*) Fœtus and placenta in extraperitoneal tissue but suppuration going on and termination as in pelvic abscess;
(*g*) In a detached horn.

(*a*) *Entire, small, and still in Fallopian tube.* Here the operator tries to remove the entire sac by ligature with silk and cutting away above it.

(*b*) *Ruptured into the peritoneal cavity which contains much blood and a small fœtus.* Such cases may be saved by Abdominal Section. Tait has recorded no fewer than 43 cases where he has operated for this with only one death.

In a recent case of abdominal section we found the pelvis filled with tarry-like blood, a small fœtus in the abdomen, and a rupture in the Fallopian tube about the size of the tip of the index finger. The fœtus was removed, a loop of the tube with the rupture on it secured with the Staffordshire knot, the pelvis sponged and then washed out with hot water (120° F.), to check oozing. It was noted at the time that the omentum became blanched; the water was passed in only for a few seconds and then sponged out. Uninterrupted recovery took place.

(*c*) *Ruptured through the part of the Fallopian tube bounded by the broad ligament, and developing there.* This gives a complex case not good for abdominal section. The operator's aim should be to open the sac and remove the fœtus without disturbing the placenta. In all extra-uterine gestation, indeed, it is absolutely imperative to avoid removing the placenta, as there is no arrangement of muscular fibre to check hæmorrhage as in normal labour. The cut edge of the sac is to be stitched to the abdominal wound and a drainage tube inserted.

In a case observed by us the placenta had grown after the death of the fœtus; the fœtus was very much compressed and any attempt to remove it by abdominal section would have caused fatal hæmorrhage by separating the placenta.

(*d*) In this form a lateral incision may be employed and access gained without opening the peritoneal cavity. The fœtus can be removed and the placenta left.

(*e*) As in (*d*) except that the peritoneal cavity is opened by a mesial incision.

(*f*) Is to be treated as in pelvic abscess.

(*g*) *Gestation in a detached horn.* This is a very rare condition and is of interest chiefly because of its close resemblance to a fibroid (*v.* p. 263). It is removed and clamped just like a fibroid.

POSSIBLE ACCIDENTS DURING LAPAROTOMY.

The accidents which may happen during Laparotomy are usually, though not always, due to the non-observance of the rules now laid down by successful operators, and should not occur when these are followed. They may be thus summed up.

(1) Leaving sponges or instruments in the abdomen,
(2) Wound of small intestine,
(3) Injury to tip of vermiform appendix,
(4) Injury to ureter,
(5) Injury of iliac veins,
(6) Tears into bladder or rectum.

Sponges or instruments will not be left in the abdomen, if they are carefully counted, and the former never torn up during an operation. A fatal result may follow if such foreign bodies are left, although cases have been recorded where they have been removed on the following day, or even been discharged many days after, the patient recovering; in the last cases they have set up abscesses escaping by the bladder or wound.

Wound of the small intestine should be stitched as follows. First stitch mucous membrane to mucous membrane with catgut and then peritoneum to peritoneum by Lembert's suture. The material to be used for the peritoneum is the finest Chinese twist, passed with a curved needle.[1]

PERITONEAL TOILETTE; CLOSURE OF WOUND.

The *peritoneal toilette* must be performed most carefully. All bleeding points are to be arrested and all fluids are to be sponged out thoroughly. The pelvis or abdominal cavity if necessary may be washed out with warm water. The peritoneum should be made thoroughly dry before the wound is closed. Careful peritoneal toilette with scrupulous asepsis is the key to success.

The abdominal wound may be *closed* with silk or silkworm catgut. Silk is very good and the stitches may be passed as in an ordinary wound. They should not be far apart (half an inch or so between each), and should include the whole thickness of the abdominal walls. The skin if necessary may be more accurately approximated by superficial horsehair stitches.

Some operators unite the peritoneal edges with catgut and then use silk for muscle and skin.

ELECTRICITY IN GYNECOLOGY: THE APOSTOLI METHOD OF TREATMENT.

Keith's Opinion of the Apostoli Method of Treatment.

INTRODUCTORY.—The history of the employment of Electricity in Gynecology has already been referred to under Treatment of Fibroid Tumours of the Uterus (p. 427). We should call especial attention to the closing sentence in the passage cited from T. Keith on p. 428:—"What I now plead for is, that for a time all bloody operations for the treatment of uterine fibroids should cease, and that Dr Apostoli's treatment as practised by him should have a fair trial." In the same connection, we should also quote from the dedication to Dr Apostoli, by the same author in the book by himself and Skene Keith on *The Treatment of Uterine Tumours by Electricity*[2]:— "Since we began your treatment, now more than two years ago, we have ceased to perform any operation on the uterus by abdominal section. . . . For long, I had hoped much from electricity in the treatment of fibroids, but had only met with disappointment till your method was made known to me."

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[1] See Treves' Intestinal Obstruction.

[2] Edinburgh, Oliver & Boyd, 1889.

Accordingly, it is in the line of following out Keith's advice, that we limit this short chapter to a statement of Apostoli's method of Electrical Therapeutics in Gynecology, without at present expressing a judgment as to the permanent value of that form of treatment.

History of the Apostoli Method.

History.—Apostoli tells us that he studied the surgical employment of electricity at the *Clinique* of Dr A. Tripier whose memoir to the Academy of Science in Paris, on Faradisation in the Treatment of Hypertrophies of the Uterus,[1] opened up the way. Apostoli saw the weak points of Tripier's practice: among others, that the currents employed were too feeble, their intensity not regulated and measured, the point of application wrongly chosen, and the different effects of the Faradic and the Galvanic (or Voltaic) currents, as well as of the positive and the negative poles not distinguished. He began to work out his own ideas in 1882; and in 1883, he described his electric treatment of Perimetritis, reading a paper on that subject at the Congress of Copenhagen in 1884.[2] In this same year (1884) he laid a memoir on the subject of Treatment of Fibroid Tumours of the Uterus by Electricity before the Academy of Medicine of Paris; the subject, as already mentioned (p. 427), of his paper read at the Dublin meeting of the British Medical Association in 1887. It was also in 1887 that he published a book on the *Electric Treatment of Chronic Metritis and Endometritis.*[3] In conclusion, we should mention his papers "On Some New Applications of the Induced or Faradic Current in Gynecology"[4] and "On the Treatment of Salpingitis,"[5] and that in 1888 he was able to point to many distinguished British and American gynecologists who had adopted his method. Notable among these, is Thomas Keith; and we close this historical note by again referring to the treatise, by himself and his son Skene Keith, which has just appeared and may be said to complete the introduction of the Apostoli method to the medical profession in this country. It is the detailed account of the first one hundred and six consecutive cases of Uterine Tumours treated by electricity; and in the conclusion of his dedication to Apostoli Thomas Keith says—"That you will in a few years see your treatment adopted all over the world I have little doubt; and no one can wish you success more heartily than I do."

Note on Electrical Terms used.—In order to make clear the description of Apostoli's method which follows, it will be well first to explain some of the terms used, so that students may read straight on without the interruption of consulting books on electricity which may not be at hand at the time.

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[1] Hyperplasies conjonctives des organes contractiles de l'emploi de la faradisation dans le traitement des engorgements et deviations de l'utérus et de l'hypertrophie prostatique: *Comptes Rendus de l'Academie des Sciences*, Août 1859. Leçons de clinique sur les maladies des femmes: Paris, Octave Doin, 1883.

[2] Sur un nouveau traitement des périmétrites: *Comptes Rendus du Congres de Copenhague*, Section d'Obstetrique et de Gynécologie, p. 141.

[3] "Sur un nouveau traitement de la métrite chronique, et en particulier de l'Endométrite, par le Galvano-caustique chimique intra-utérine: Paris, Octave Doin, 1887.

[4] *Brit. Med. Jour.*, 1888, I., p. 63.

[5] "Notes on a Case of Hydrosalpinx; A New Method of Electric Treatment:" *Brit. Med. Jour.*, 1888, I., 998.

Kinds of Electric Current.

In the first place, there are two distinct kinds of electric current spoken of, the *Galvanic* (perhaps more accurately the "Voltaic") and the *Faradic.* The former is the electricity that flows in continuous current through the wires from the zinc and copper plates in a voltaic or galvanic cell or battery when their ends are connected. As sulphuric or other oxidising acid is added to the water in the cell, this kind of current is *chemical* in its origin. When the current flows, the zinc plate is used up, its consumption furnishing the energy to drive the current through the cell and connecting wire: the cell, in fact, has been aptly compared to a sort of chemical furnace in which the fuel is zinc. The faradic current, on the other hand, is an *induction* one, *i.e.*, is a current induced in a closed circuit when a magnet is moved near it or when it is moved across the magnetic field, or when an electric current whose strength is changing is near it. The source of this current is, accordingly, not chemical but electro-magnetic.

Electro-motive Force and Strength of Current.

That which tends to produce a current, *i.e.*, to move electricity from one place to another, is called *Electro-motive* force; the *Strength of a Current* is the quantity of electricity which flows past any point of the circuit in one second, and is directly proportional to the electro-motive force and inversely proportional to the resistance which the current has to overcome in its flow. This truth with regard to the strength of an electric current flowing in a circuit is, from the name of its discoverer, known as *Ohm's Law*, which may be formally stated here—"*The strength of the current varies directly as the electro-motive force, and inversely as the resistance of the circuit.*" The terms "strong," "great," and "intense," applied to currents all mean the same thing.

Measurement of Strength of Electric Currents.

To measure the strength of electric currents there is used an instrument called the *Galvanometer*, in which a magnetised needle is deflected by a current passing above and below it through a coil of silk-covered insulated copper wire—the amount of deflection depends upon the strength of the current (though not proportional to it) and a properly graduated dial enables us to ascertain perfectly the strength of the current. The sensitiveness of the instrument is greatly increased by the use of the *astatic* needle, a compound one in which the directive power of the earth is neutralised by the joining of two magnetised needles of equal power connected one above the other by a central pin so that the north pole of the one lies over the south pole of the other and the south pole over the north pole of the other. The sensitiveness is also increased within certain limits by increasing the number of turns of the coil of silk-covered wire. A galvanometer must be able to measure the quantity of electricity passed, and should be of a degree of sensitiveness corresponding to the strength of the current to be measured—very sensitive for very small currents, less sensitive for strong currents.

Units of Measurement.—Every kind of measurement requires a unit: as in measuring length we might take the inch, foot, yard, or mile; and in measuring mass or weight we use the grain, ounce, pound, hundred-weight, or ton. Accordingly, for measuring electricity, we have in the first place a series of what are called *absolute* electric units derived from the fundamental Centimetre-Gramme-Second system (C.G.S.) in which—

The *Centimetre* (·3937 in.) is the unit of length,
The *Gramme* (15·432 grns.) is the unit of mass, and
The *Second* is the unit of time.

There are three *derived* units which it is necessary to bear in mind in order to understand the electric units which follow. These are—

The *Dyne* or unit of force, that force which acting for one second on a mass of one gramme gives to it a velocity of one centimetre per second;

The *Erg* or unit of work, the work done in overcoming unit force through unit distance, *i.e.*, in moving a mass through a distance of one centimetre against the force of a dyne; and

Unit Strength of Magnetic Pole.—The unit magnetic pole is of such a strength that when placed at a distance of 1 cm. in air from a similar pole of equal strength it repels it with a force of one dyne.

We are now in a position to understand the definition of the units referred to in the explanation of Apostoli's method. As that method deals with Current Electricity in which the positive and negative poles are in properties the same as magnetic ones, these units are called Electro-magnetic.

Electro-magnetic Absolute Units.—(1) *Unit Strength of Current* is that of a current such that if one centimetre length of its circuit be bent into an arc of one centimetre radius it will exert a force of one dyne on a unit magnet pole placed at the centre of the circle of which the arc is a part, so as to be always a centimetre away from the current.

(2) *Unit Quantity of Electricity*, that quantity of electricity which is conveyed by current of unit strength in one second.

(3) *Unit of Difference of Potential or of Electro-motive Force* exists between two points when it requires the expenditure of one unit of work (Erg) to bring a unit of + electricity from one point to the other against the electric force.

(4) *Unit of Resistance* is possessed by a conductor when unit difference of potential between its ends causes a current of one unit of quantity per second to flow through it.

The first two of these absolute units were found to be inconveniently small and the last two inconveniently large, accordingly a committee of the British Association devised a system of "practical" units in which they substitute for the fundamental units *centimetre* and *gramme*, the Earth's quadrant (1,000,000,000 centimetres) and $\frac{1}{100,000,000,000}$ of a gramme.

Electro-magnetic Practical Units.—(1) The *Volt*[1] is the practical unit of *Electro-motive force* and is 100,000,000 absolute units.

(2) the *Ohm*[1] is the practical unit of *Resistance* and is 1,000,000,000 absolute units.

(3) The *Ampère*,[1] the practical unit of *Strength of Current*, is that furnished by a Volt through an Ohm and is $\frac{1}{10}$ of the absolute unit. In medical electricity, however, the strength of the current is measured in milliampères.

(4) The *Coulomb*[1] is the practical unit of *Quantity* of current electricity and is $\frac{1}{10}$ of the absolute unit.

With the aid of these units, we can now state Ohm's law in more definite language, using "*ampères*" to measure "strength of current," "*volts*" for "electro-motive force," and "*ohms*" for "resistance of circuit." Thus the two forms would run as follows:—

(General Form.) The *strength* of the current varies directly as the *electro-motive force* and inversely as the *resistance* of the circuit;

(Definite Form.) The number of *ampères* of current is equal to the number of *volts* of electro-motive force, divided by the number of *ohms* of resistance in the circuit, or more briefly

The number of *ampères* is equal to the number of *volts* divided by the number of *ohms*.

More than one method has been tried of fixing a standard for these units. Thus, the British Association (B.A.) in 1863 constructed coils of German silver to give the resistance of an ohm, but there was some doubt whether the B.A. unit exactly represented the practical unit of resistance as defined above. Accordingly, it was decided at the International Congress of Electricians in Paris in 1881 that the ohm could be most accurately measured by the resistance offered to the electric current by a column of pure mercury with a cross-section of one millimetre; and, in 1884, it was decided at the Paris Congress that the length of the column should be 106 centimetres. This gives almost exactly[2] the theoretical ohm, and is a little larger than the B.A. unit.[3]

In concluding this note on the electric terms used, we may mention that the ends of the wires leading from the battery are called *Electrodes;* that *Electrolysis* (*i.e.* Electric Analysis) is, strictly speaking, the process of decomposing a liquid by means of an electric current, but is also applied to the disintegrating process said to be set up in tumours or other tissues when a current has been passed through them; and that Apostoli describes his method as *mono-polar* when only one pole is active, *i.e.*, is applied to uterus, vagina, or tissue to be acted upon, and as *bi-polar* when both poles are so applied.

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[1] These four terms commemorate the names of four famous electricians:—*Alessandro Volta*, who shares with Galvani the discovery of current electricity; *G. S. Ohm*, whose law regulating the strength of current electricity has been given above; *André Ampère*, the founder of the science of electro-dynamics; and *Charles A. de Coulomb*, the inventor of the torsion balance and demonstrator of the law that electrical attraction and repulsion vary inversely as the square of the distance.

[2] Lord Rayleigh calculated that the length of column to give the exact ohm should be 106·21 cm.

[3] The B.A. ohm is ·9887 of the new *legal* ohm and the B.A. volt is ·9887 of the *legal* volt.

Apostoli in describing his application of the faradic current uses the old phraseology (employed before the discovery of Ohm's law) when he speaks of "currents of quantity" and "currents of tension" or "intensity currents;" meaning by the former a current flowing through a circuit in which there is a very small resistance inside the battery[1] or in the wire, and by the latter a current which has to overcome greater resistance and which requires, therefore, a high electro-motive force.[2] These terms are scientifically misleading as the great resistance tends to counteract the high electro-motive power, and the principal phenomena of electro-magnetism are due not to the mere presence of electricity however great its tension but to its state of current or flow. The terms are, however, convenient; and, what is more to the purpose here, Apostoli's whole method is founded upon his declared discovery that the physiological effects of currents in the two conditions are very different.

ACTION OF DIFFERENT CURRENTS AND POLES.

1. *Action of the Galvanic or "Galvano-caustic" Current.*

For this current Apostoli claims two successive and distinct effects:—(1) A chemical (not thermic) cauterisation at points of entrance and exit of the current, and in proportion to dose and duration; and (2) An interpolar action, through the entire uterine substance, as the current passes from internal to external pole.

It is this current he uses in the treatment of Uterine Fibromata; and he describes his method as "galvano-caustic, intra-uterine, and monopolar." The current is used in various forms, as will be seen from the summary of the 94 cases fully described in the second part of his memoir of 1884 on the Treatment of Fibroid Tumours of the Uterus:—

In 59 cases, the galvano-caustic current with positive pole active was used;
,, 21 ,, ,, ,, ,, ,, ,, negative ,, ,, ,, ,,
,, 9 ,, ,, ,, ,, ,, ,, negative and positive poles
successively active was used; and
,, 5 ,, the galvano-puncture was used, preceded or followed by

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[1] The *internal resistance* is diminished by having larger plates or bringing them closer together; the former is usually done by connecting the zincs of several cells, producing practically one large zinc, and the same for the coppers.

[2] *Brit. Med. Jour.*, 1888, I., p. 64. "No Apparatus for Faradisation," he writes, is "complete without two independent bobbins; which according to the length and thickness of the wires gives currents differing in qualities and characters. The bobbin with short thick wire gives current of quantity because the wire is less resistant and lets pass a greater volume of electricity. The bobbin with longer and finer wire is called the bobbin of tension; the current along it is called the current of tension."

positive or negative intra-uterine cauterisation. The effects of these various forms are clearly stated.

a. Effect of Galvano-caustic current with POSITIVE POLE *active.*—The local effect of the positive pole is said to be *coagulating* and *hardening.* It is accordingly to be the active intra-uterine one in all cases of bleeding fibromata or where there is accompanying obstinate leucorrhœa. It is described as *arresting hæmorrhage* instantly if the cavity of the uterus be of normal dimensions, the action relatively intense, and hæmorrhage not excessive; otherwise, it acts more deliberately and gradually.

b. Effect of Galvano-caustic current with NEGATIVE POLE *active.*—This pole is declared to produce a state of *temporary congestion* without direct hæmostatic effect. The interstitial circulation of the uterus is thus temporarily stimulated and hurried on. Therefore, a regression of *non-hæmorrhagic* fibromata results, either from the congestion or the supplementary artificial and subsidiary hæmorrhages. This pole, therefore, is to be used for fibroids accompanied by amenorrhœa or dysmenorrhœa. In inducing a regression of the tumour by the secondary interstitial changes from interpolar action, Apostoli believes that the negative pole is the more powerful. Further, if the negative pole be made to enter by puncture into the substance of the fibroid deposit, it "becomes by 'a sort of *contre-coup*' markedly hæmostatic due to its cutting off the supplementary circulation by the rapid atrophy the negative current causes."

c. Effect of Galvano-puncture.—This form of application is said to be daily assuming more importance. It is indicated *necessarily* in uterine atresia, or where there is such uterine displacement as to prevent the introduction of a sound. It is to be *preferred* where the puncturing can be combined with intra-uterine cauterisation to hasten and make sure of the desired effects. The chief points in the method of applying this treatment are :—

(1) Antiseptic irrigation of Vagina ;
(2) Make punctures shallow, not deeper than 1–2 cm. ;
(3) Make puncture on most prominent part of fibroid, where possible in posterior *cul-de-sac ;*
(4) Make punctures without speculum, slide trocar through sheath after having chosen by touch the point where the puncture is to be made ;
(5) Ascertain any seat of pulsation so as to avoid wounding an important vessel ;
(6) In case of any unusual hæmorrhage, immediately dilate vagina with an expanding speculum and if necessary apply a pressure-forceps to the bleeding point.

"No operator," Apostoli adds, "should admit the failure of intra-uterine galvano-cauterisation before having had recourse to the galvano-punctures, which he must enforce either with or without anæsthetics."[1]

2. *Action of the Faradic or Induced Current.*

This current is said to have "contractile power" but its effects differ as the "current of quantity" or the "current of tension" is used. The former, the direct excitant of *muscular contractility*, is employed to overcome uterine muscular inertia and produce a temporary vascular activity; it thereby excites circulation where there is congestion and stagnation with consequent arrest of the nutrition of the uterus. The "*current of tension*" acts more on the *sensibility* than on the muscular contractility; it has therefore been used in all cases where *pain* is the leading symptom. "No other sedative, recognised in Gynecology, for the purpose we are treating of, equals the faradic current of tension." Certain rules are laid down for the application of this current which are declared to be essential to its use, and which will be found below.[2] This treatment Apostoli strongly recommends for perimetritis, ovarian pain, and intense sensibility about the lower part of the vagina. As a whole, the induced current is a direct excitant of muscular fibre. Where the mucous membrane is at fault as in endometritis, there is nothing on which it can act curatively, and the constant or galvanic current is the remedy.

THE APPARATUS AND INSTRUMENTS.

Apparatus and Instruments.

1. *For the Use of the Galvanic Constant Current.*[3] — (1) The first requisite is, as Apostoli puts it, some sort of a *battery* capable of yielding an adequate constant current of electricity, *i.e.*, one rising from 10 to about 300 milliampères; and it should be provided with a regulator by which the circuit is made to include any number of cells desired, as well as with a Current Interrupter[4] and a Commutator or Current Reverser.[5]

(2) The second requisite is a good *galvanometer* "of intensity," *i.e.*, able to measure a current of considerable strength, the graduation being extended up to 250 ampères at least. Keith uses Gaiffe's instrument.

(3) The next portion of the apparatus to be considered is the intra-uterine *electrode.* In form it is like a uterine sound, straight or only slightly curved, and long enough to reach the fundus of an enlarged uterus. The positive pole corrodes all metals except gold, aluminium,

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[1] The Dublin paper of 1887: see *Brit. Med. Jour.*, 1887, II., pp. 700-701.

[2] "On Some New Applications of the Induced or Faradic Current in Gynecology," by Apostoli, *Brit. Med. Jour.*, 1888, I., p. 63.

[3] *Brit. Med. Jour.*, 1887, II., 700. See also Woodham Webb on the "Treatment of Fibroids of the Uterus by Electricity: the Apparatus and Instruments"—*ibid.*, 1887, I., p. 1208.

[4] Sometimes called a "*Rheotome.*"

[5] Sometimes called a "*Rheotrope.*"

and platinum; and it is found that platinum is the material best adapted for this purpose. Carbon is also very good.

(4) Very important is the inoffensive *cutaneous* electrode of wet potter's earth, spread out in a layer half-an-inch thick and covering the lower part of the abdomen. This is said to be the master point of this method of treatment, as it enables strong currents to be employed without injury to the skin which would be cauterised were the external electrode of the same small area as the internal.

(5) For the galvano-punctures there is required a steel *trocar or needle.*

2. *For the Faradic or Induced Current.*—(1) The first requisite here is a faradic battery.

(2) A special form of *sound*, for Apostoli uses the bi-polar method for the faradic current. Accordingly, the sound contains both poles side by side within its substance, so that the circuit may be closed within the uterus (if that be possible) or vagina.

THE CURRENT: ITS STRENGTH, DURATION, AND FREQUENCY OF OPERATION.

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For the galvanic current, Apostoli repeatedly insists that it is virtually a uterine cauterisation, in which the highest possible degree of electro-chemical action is used, and that the current must be continuous without any interruption during the operation. As to the *strength* of the charge, his absolute rule is that it be exactly measured, and that it be as great as the patient can bear up to what the desired effect requires: the range attainable is as high as 300 milliampères. The *duration* of the application necessary to produce effective cauterisation is on an average from five to eight minutes. In Keith's 106 cases, five minutes was by far the most common duration. The *number* of applications required to produce good results varies with different patients, according to the nature of the disease and the object sought for. In Apostoli's treatment of fibroids the average was over fifteen per patient. In Keith's cases, they sometimes number more than fifty, and were made usually daily or every alternate day except during the menstrual period.

The place of application must also be strictly localised, and this is ensured by the method being intra-uterine mono-polar.

Principles are also laid down governing the application of the faradic current. The strength varies within the extreme known limits. In such inflammatory conditions as perimetritis, and above all in acute cases, the rule is to begin with a very small dosage and increase milliampère by milliampère as the power of endurance increases and the phlegmasia shows a tendency to give way. In using this current for ovaralgia, however, the direction is to press boldly forward if the uterine region be healthy: for the relief of pain, the application is not to end even after twenty minutes till the pain has disappeared; generally the first sitting requires most time, the subsequent ones only completing what it has begun. These applications of the faradic current should follow each other every day or even twice a day. The number of sittings varies: from two to five are said to be sufficient for simple neuralgia, but the range is much greater for inflammation.

PATHOLOGICAL CONDITIONS IN WHICH ELECTRICITY IS USED IN GYNECOLOGY.

Conditions for which Electricity is used in Gynecology.

In the opening historical paragraph of this brief sketch of Apostoli's method, it will be seen that he has published special papers on the treatment of fibroid tumours of the uterus, chronic metritis and endometritis, perimetritris, localised inflammation of the vagina, hydrosalpinx and salpingitis; and he says that he has applied the continuous galvanic current for most of the maladies known to Gynecology.

So far as our present knowledge goes, the suitable cases for Apostoli's method are—

1. *Bleeding Fibroids.*—In these the internal pole is positive, and a current strength of 50 to 150 ma. may be used.
2. *Impacted or large Fibroids causing pressure symptoms.*—Puncture here with negative needle.
3. *Dysmenorrhœa of pathological anteflexion: membranous dysmenorrhœa.*—Internal electrode negative, and current strength about 50 ma.
4. *Cellulitis.*—Internal electrode covered with cotton wool and placed vaginally.
5. *Pain, ovarian.*—Here the faradic current is said to give good results.

We say nothing here in the way of describing instruments or details of treatment. We may say, however, that we have found as an abdominal electrode Engelmann's broad plate with cotton wool soaked in salt solution quite as good as and much more convenient than potter's clay.

RESULTS.

Results.

The results claimed for this method in the treatment of tumours of the uterus have already been given (p. 429)— "in every case, the tumour was reduced in size, hæmorrhage and pain gone, and general health restored." The Keiths state in the introduction to their book that they now know that cases with hæmorrhage are the best for treatment, and admit that in their series of cases there are some imperfect and incomplete ones, but repeat their confidence in the immense utility and ultimate triumph of the method. Cases of enlargement of the uterus have every one been perfectly cured. Similarly good results are claimed in other affections.

THE SYSTEMATIC TREATMENT OF NERVE PROSTRATION.

LITERATURE.

Bramwell, Byrom—The Diseases of the Spinal Cord: Edin. 1882. *Gaskell*—Preliminary Notice of Investigation on the Action of the Vasomotor Nerves of Striated Muscle: Proc. Roy. Soc., Lond., 1876-7, p. 430. *Goodell*—Lessons in Gynecology, Lesson XXX.: Philadelphia, 1880. *Mitchell, Weir*—Fat and Blood, and how to make them: Lond., 1878. *Playfair, W. S.*—The Systematic Treatment of Nerve Prostration and Hysteria: Lond., 1883.

The gynecologist will not have long practised his specialty before he finds that he has occasionally to deal with a class of patients who are quite *sui generis.* The condition of such puzzles him at first extremely, inasmuch as he can find no tangible disease but yet is bound to confess that the general condition of health is highly unsatisfactory. Very often these patients have gone the round of all medical and surgical specialists, and have come at last to the gynecologist in the hope that his art may do something to remedy their lamentable state.

The class of patients has the following characteristics:—They are thin, often emaciated, unable for any exertion, suffer from neuralgia, have little or no appetite, and are nursed by some devoted sister or mother or husband. As we have said, there is no local condition to account for their state; but often there is a history of overwork, as in the case of governesses and teachers, or of an improper training. By this latter we mean that a sensitive child of high nervous organisation has been over-cultivated, her mental energies too constantly on the rack, and has ultimately collapsed under the strain. For this class of patients Weir Mitchell of Philadelphia introduced a plan of treatment in his well-known book, the results of this method being in suitable cases highly satisfactory.

The main factors in Weir Mitchell's plan are—

I. Seclusion of the patient, and absolute exclusion of all but the medical attendant and nurse;
II. Absolute Rest in Bed;
III. A Systematic extra-feeding of the patient;
IV. Use of Massage and Electricity.

I. *Seclusion of the patient, and absolute exclusion of all but the medical attendant and nurse.*

This is imperative, and the treatment should not be gone on with unless this condition is agreed to absolutely. Very often the friends have devoted themselves to every whim and fancy of the patient so assiduously as to impair their own health without improving that of their tyrannous charge.

The nurse should be thoroughly trained and refined, and should implicitly obey all the medical attendant's orders.

II. *Absolute rest in bed.*

This means muscular and mental rest, and reduces the force and frequency of the heart's action. The nutrition taken is above the amount worked off, and benefit in this way results. This absolute rest is after a while modified, and the patient allowed to sit up for a little until she may at length go about as usual, with the exception of taking a two-hours' sleep during the day.

III. *A systematic extra-feeding of the patient.*

This is one of the essential features of the method. Weir Mitchell begins with milk diet, about three ounces every two hours, until two quarts are given during the day. At the end of the first week raw beef soup[1] is given, and gradually the diet is increased until the dietary for one day, in one of Mitchell's cases, was as follows:—Coffee at 7; at 8, iron and malt. Breakfast—a chop, bread and butter, of milk a tumbler and a half; at 11, soup; at 2, iron and malt. Dinner (closing with milk, one or two tumblers) consisted of anything she liked, and with it she took about six ounces of Burgundy or Dry Champagne. At 4, soup. At 7, malt, iron, bread and butter, and usually some fruit, and commonly two glasses of milk. At 9, soup; and at 10, her aloes pill. At noon, massage occupied an hour. At 4.30 p.m., electricity was used for an hour."

In addition to this diet, iron in the form of Blaud's pills (p. 583) and maltine may be added to aid the digestion of starchy food. The maltine should be given in cold milk or at the end of pudding. The evident question now arises, How does the patient digest all this? The digestion of this immense mass of food is rendered possible by the last feature of the treatment.

IV. *The use of Massage and Electricity.*

This is most important, and consists in the systematic rubbing of the patient and the application of Faradic electricity.

The massage is begun a few days after the milk diet, and consists in the systematic kneading of the skin and muscle of the whole body first for half-an-hour, and afterwards for an hour daily. A special massage nurse is necessary for this, and it should be kept up for six or seven weeks. Cocoa-nut oil should be used to render the manipulations easy, and it will also help in fattening the patient.

Electricity is employed for half-an-hour daily in order to cause muscular action, increase the blood supply to the muscle, and act as a tonic and bracing agent. Mitchell has found that after the electricity the temperature usually rises about $\frac{4}{5}$ths of a degree. The current should not be painful, and Ziemssen's diagrams of the points of stimulation should be followed as a guide.

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[1] Chop 1 lb. of raw beef, and place in a bottle with 1 pint of water with 5 mm. strong hydrochloride acid. Place in ice all night, and in the morning set in a pan of water at 110° Fahr. for 2 hours. Strain thoroughly, and give filtrate in portions daily.

For further details, the literature given should be consulted by the practitioner wishing to carry it out.

The results in some cases are wonderful, and as yet no harm has been shown to arise to the kidneys from the over-feeding. The bowels must of course be regulated, and a daily motion secured. Before beginning this treatment in any case, it should be thoroughly ascertained that there is no organic disease, and no obscure and rare form of disease such as Addison's disease, myxœdema, etc. A consultation with a specialist should always be had in cases of doubt.

The patient for whom it is suitable is one where there has been under-feeding or improper food, undue mental strain, and consequent loss of flesh and nervous energy.

HYSTERIA AND HYSTERO-EPILEPSY.

LITERATURE. *Bourneville et Regnard*—Iconographie photographique de la Saltpétrière: Paris, 1877. *Bourneville et d'Olier*—Recherches sur l'Epilepsie, l'Hystérie et l'Idiotie: Progrès Médical, 1881. *Charcot*—Diseases of the Nervous System: Sydenham Society's Series, London, 1877. *Fritsch*—Krankheiten der Frauen: Braunschweig, 1881. *Jolly*—Article "Hysteria" in Ziemssen's Cyclopædia of Medicine. *Mills*—Hystero-epilepsy: American Journal of the Medical Sciences, Oct. 1881. *Richer*—Études cliniques sur l'Hystéro-Epilepsie: Paris, 1881.

HYSTERIA.

The frequency of hysteria as a complication of pelvic disease requires that we notice it briefly. We can only indicate the leading points and refer the student to the literature given above. The connection which exists between hystero-epilepsy and the ovary also calls for short reference.

As to the pathological changes present in hysteria, little definite is known, except what Freund has described in Parametritis chronica atrophicans (*v.* p. 174). In regard to etiology, we note first the influence of heredity; defective moral education by a hysterical mother, and the power of imitation in developing hysteria, confirm this influence. A reduced state of the system is also a very important cause, and the one to which treatment must be specially directed. As to the exciting causes usually given (such as dysmenorrhœa, uterine displacements, ovaritis), these are so common that we cannot regard them as a cause of hysteria. The only ascertained facts are that removal of the ovaries has in some cases cured hysteria, and that pressure in an ovarian region does sometimes inhibit a hystero-epileptic attack.

The symptoms of hysteria are protean. *Sensation* is affected as follows. There may be increased sensitiveness to touch (hyperæsthesia) and to pain (hyperalgesia). Hyperæsthesia of the joints is important as simulating arthritis, from which it is diagnosed by the fact that the pain is around (not in) the joint and that it is not aggravated on forcing the articular surfaces together. Neuralgia along the spine with tender points simulates disease of the vertebral column. The typical headache (known as the "clavus hystericus" from the localised and intense character of the pain), neuralgia of the muscles generally, localised pain in the breast, in one ovarian region, in the bladder and urethra, and the perversions of the special senses need only be mentioned here. When sensitiveness is impaired, it is usually that to pain; while that to heat and touch remains; one half of the body may be affected, or isolated portions of skin—as the back of the hands and feet. Loss of the muscular sense prevents the patient, if the eyes be closed, from knowing what movements she has made. Anæsthesia of any of the mucous membranes may occur. The special senses are often also impaired.

The *motor* disturbances resulting in convulsions will be referred to under hystero-epilepsy. The paralysis due to hysteria is very important in regard to its diagnosis from that due to a cerebral or spinal lesion. It varies in distribution and may affect one limb only, or the arm and leg of one side, or the arm on one side and the leg on the other. In the face, the levator palpabræ superioris is frequently affected; paralysis of the muscles supplied by the facial and hypoglossal nerves is rare. This last fact is of value in diagnosing between hysteria and hemiplegia; further, gradual onset, presence of anæsthesia and its varying distribution, normal reaction to the electric current, the progress of the case with variations in the degree and extent of the paralysis, warrant us in diagnosing hysteria. The diagnosis of hysterical paraplegia from multiple sclerosis is more difficult. Paralysis may also affect the laryngeal muscles, producing aphonia, and the muscular wall of the œsophagus, stomach, and intestines.

Of the disturbances of the circulatory system, the most important is palpitation with increased force of the apex beat; in some cases, the heart's action fails and there is syncope. Vaso-motor disturbances are seen in the pale skin which does not bleed when pricked, and in the flushings and profuse sweatings which are often present. Salivation and polyuria often occur after a hysterical attack.

In forming a diagnosis, we must be careful to exclude the possibility of organic, cerebral, or spinal disease. A case reported by Bruce[1] is of interest in this connection; here the patient had symptoms of hysteria, there was no optic neuritis or other indication of cerebral mischief, and yet the post-mortem showed a large tumour in the temporo-sphenoidal lobe.

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[1] Brain, part XXII.: 1883.

In treatment, the following points are of importance. Care must be taken in the mental and moral training of the children, where there is a tendency to hysteria.[1] If the system is below par, Weir Mitchell's method should be tried, and iron given when there is anæmia; cold baths are always beneficial. In grave cases, Battey's or Tait's operation may be suggested but never urged, as the results are not brilliant.

HYSTERO-EPILEPSY.

This term is applied to attacks which present at once the features of hysteria and epilepsy; they are also described by Charcot as Grave Hysteria or Hysteria Major. The standard work on this subject is by Richer; the English reader will find a good account of it in the paper by Mills, cited above, in which he gives (with the description of two cases observed by himself) the results of the valuable researches of Charcot, Bourneville and Regnard, and Richer.

Hystero-epilepsy is rare in this country. We have seen one case in which it was present in a modified form. The seizures consisted in regular movements of the lower limbs, so that the patient performed a sort of dance till she sank down exhausted; pressure on the ovary checked the attack.

A typical attack is divided by Richer into four periods: (1) the epileptoid period; (2) the period of contortions and great movements; (3) the period of emotional attitudes; (4) the period of delirium.

For some days before an attack, *prodromic symptoms* occur in the form of the varying symptoms of hysteria given above. Charcot[2] has drawn attention to the occurrence of acute pain or sensitiveness to pressure in one ovarian region as forming the starting point of the aura hysterica; slight pressure in one ovarian region will, in some cases, excite an attack. In other cases, different hyperæsthetic areas have been localised, the touching of which produces an attack. These areas are known as hystero-epileptogenic zones and are analogous to the epileptogenic zones described in epilepsy by Brown Séquard. During the *epileptoid period* there is complete loss of consciousness; further there is (as in true epilepsy) a tonic phase, a clonic phase, and a phase of resolution; it lasts several minutes. It is important to note that there is loss of consciousness in grave hysteria, as the absence of this in ordinary hysterical convulsions is one of the features by which the latter are diagnosed from an epileptic attack. The *contortions* and *great movements* of the second period differ from those of the first period in this that the muscles are quite relaxed apart from the contortions; there is no tetanus. Consciousness is not lost. The whole body may be rolled about, as if the patient were writhing in pain; or more regular movements occur, *e.g.*, the movements of "salutations" in which the patient, lying with the knees bent up, suddenly throws the head and chest forwards so that the forehead strikes the knees and then falls back again. The *emotional attitudes* of the third period are beautifully illustrated by a series of photographs in Bourneville and Regnard's work. Ecstacy, irony, disdain, terror, and other emotions are seen on the face, and the attitude of the body corresponds to the expression. Hallucinations are present, and the patient remembers these afterwards; voluntary motion is unaffected, but general and special sensibility are completely suspended. This period lasts from a few minutes to a quarter of an hour. The fourth period is not sharply marked off from the preceding one. The patient partially recovers consciousness and is influenced by external impressions, but these are largely mixed with hallucinations.

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[1] Clouston: Puberty and Adolescence medico-psychologically considered: Edin., 1880.

[2] *Lectures on Diseases of the Nervous System:* Sydenham Translations, 1877, p. 262.

A succession of hystero-epileptic attacks produces the hystero-epileptic status which is diagnosed from the status epilepticus by the important fact (ascertained by Charcot) that there is no rise of temperature during it.

As to prognosis, it is less grave than in true epilepsy.

As to treatment, pressure on the ovaries often checks the attack at once; place the patient on the back and forcibly press the fist into the iliac region. Inhalation of chloroform or nitrite of amyl, and the subcutaneous injection of morphia are also valuable. For the treatment by electricity and metallo-therapy, we refer the practitioner to Richer's work. Moral discipline is specially valuable.

MASSAGE.

LITERATURE. *Profanter*—(1) Die Massage in der Gynäkologie; (2) Die Manuelle Behandlung des Prolapsus Uteri: Wien, 1888. *Reibmayr*—Die Massage: Leipzig, 1889. *Resch*—Uber die Anwendung der Massage bei Krankheiten der weiblichen Sexualorgane: Cent. für Gynäk., No. 32, 1887. See also Index of Literature in Appendix.

One of the most common cases in Gynecology is that where, as the result of a previous attack of pelvic inflammation, the uterus and ovaries are bound down and fixed by more or less dense adhesions—usually peritonitic. For these cases many forms of treatment, ranging from the hot douche up to abdominal section, are recommended, and will be found described in various parts of this Manual. At present we wish briefly to refer to a method of treatment recently come into vogue—Massage.

By this we mean here Bimanual Massage of the adherent tissues or organs so as to slacken these, promote vascular and lymphatic absorption, and in this way bring about a more healthy condition of the local circulation and relief to the nerve pressure supposed to be exerted by the cicatricial tissues.

The originator of this form of treatment is a Swedish layman, Brandt, and his work has been taken up by several German gynecologists, among whom are Schultze, Profanter, Schauta, and others.

Before going on more particularly to the question of indications, methods, and results, we may say that we believe there are great difficulties in the way of its general acceptance. The chief one is that it involves undue manipulation of the genital organs. This is a most serious objection, and one which will in all probability be fatal to the method. Then again the manipulation will be dangerous if the diagnosis be wrong—*e.g.*, if a pyosalpinx be chosen for it. There is thus every prospect of its being supplanted in the few cases requiring it by abdominal section.

Prolapsus uteri is one of the cases specially recommended for it. Here, however, it is difficult to understand how it does good, although trustworthy observers have recorded cases of cure.

Indications. Retroversion of uterus bound down by adhesions; adherent ovaries; parametritis posterior causing pathological anteflexion; prolapsus uteri.

Methods. In chronic inflammatory cases the patient occupies the dorsal posture, with knees well drawn up and dress freely loosened. The gynecologist carefully ascertains bimanually the condition of the organs, and then, keeping the two fingers passed into the vagina fixed, he grasps or maps out by the outer hand the adhesions to be stretched, and by movement of the outer hand only, stretches these or exercises a rubbing movement on them. Rectal manipulation may be employed instead of vaginal. This bimanual massage should not be practised for more than a few minutes at each sitting, and the number of sittings must be left to the judgment of the gynecologist.

Schultze has extended this method by advocating and practising, not mere stretching, but actual separation of the adhesions. For this purpose the patient is chloroformed, the condition accurately mapped out, and the adhesions then separated by bimanual manipulation. Schultze's results have been good, but it is evident that the risks in less experienced hands are very great.

In Prolapsus uteri the method is more complicated and troublesome. Briefly it is as follows (*Profanter*).

(1) *Position of patient.* The patient has her dress thoroughly loosened and lies on a short couch (4 ft. × 2 ft. 8 in.) with her chest supported by cushions. In this way she is compelled to slacken the abdominal muscles as much as possible. An assistant passes his fingers into the vagina, replaces and anteflexes the uterus. The Masseur then with both hands grasps the uterus and draws it up as far as possible.

The patient now raises the hips from the couch thus supporting her body on elbows and feet, while the gynecologist forcibly separates her closed knees and then forcibly approximates them, the patient resisting each time. These manœuvres are repeated thrice.

The object of this so-called pelvic gymnastic is to bring into action the pelvic muscles (levator-ani, obturator internus, perineal muscles) and thus strengthen the musculature and fascia of the pelvic floor.

The patient need not be confined to bed during the intervals of the treatment.

RELATION OF GONORRHŒA TO DISEASES OF WOMEN.

LITERATURE. *Bockhart*—Beitrag zur Aetiologie und Pathologie des Harnröhrentrippen Sitzungsber d. Phyz. Med. Gesellsch.: Wurzburg, 1884. *Bokai*—Ueber das Contagium der acuten Blennorrhœa: All. Med. Zeit., 1880, No. 74. *Bumm*—Der Mikroorganismus der gonorrhoischen Schleimhaut Erkrankungen: Wiesbaden, 1887. *Cheyne, W. W.*—Suppuration and Septic Diseases: Pentland, 1889. *Metschnikoff*—Virchow's Archiv., Vol. 107. *Macdonald*—Latent Gonorrhœa in the Female Sex with special relation to the Puerperal State: Edin. Med. Jour., June 1873. *Neisser*—Ueber eine der Gonorrhoe eigenthümliche Micrococcusform: Cent. für die Med. Wissensch., 1879, No. 28; also Deutsch. Med. Woch., 1882. *Noeggerath*—Die latente Gonorrhoe u. weiblichen Geschlect.: Bonn, 1872. *Oppenheimer*—Untersuchungen über den Gonococcus (Neisser): Arch. für Gynäk., Bd. xxv., Hft. 1. *Sänger*—Ueber die Beziehungen der gonorrhoischen Infektion zu puerperale Erkrangungen: Verh. der Deutsch Gesell. für Gynäkologie, 1886. *Schwarz*—Die gonorrhoische Infection beim Weibe: Volkmann's Sammlung, No. 279. *Sinclair*—Gonorrhœal Infection in Women: London, Lewis, 1888. *Sutton*—Introduction to General Pathology: London, 1887.

W. J. Sinclair's work is the most valuable contribution to the English literature of this subject.

Up till 1872, gonorrhœa in women was not considered a serious disease, and received little special attention from gynecologists. Noeggerath's work, the discovery of the importance of tubal disease, and, above all, the recent progress in Bacteriology, have all tended to show that gonorrhœa is a most important factor in the causation of gynecological diseases. Noeggerath's clinical researches were specially important, as he enunciated the doctrine of latent gonorrhœa, *i.e.*, the power of a chronic or even insignificant discharge in the male urethra, when of gonorrhœal origin, to infect the female, and cause serious or even irremediable disease. His work has not only been amply confirmed, but his theory of the cause of gonorrhœa—viz. the existence of some organism—has now been fully established by the discovery of Neisser's gonococcus. Noeggerath asserted that cases of obscure peritonitis or other inflammatory affections in married women were due to an uncured gonorrhœa of the husband, acquired even years before marriage, and this doctrine, though disbelieved by many at the time, is now in great part held by most.

A great stride was made in 1879 by the discovery of the gonococcus by Neisser. This investigator found that gonorrhœal pus stained with methyl violet, and mounted in a way to be presently described, contained micrococci quite characteristic even on microscopical examination. They are diplococci with concave surfaces towards one another, and $2{\cdot}2$—$2{\cdot}5\mu$ in length (p. 147). Since Neisser's discovery a very large amount of work has been published on this subject, and it has been established that this gonococcus is pathogenic only for gonorrhœa: it has been cultivated, though with difficulty, in human blood serum, and from pure cultivations, gonorrhœa has been inoculated in man (Bockhart and others). It has been also found (by Bumm especially) to be the cause of gonorrhœal ophthalmia of infants. Many other interesting facts have been ascertained in regard to it, *e.g.* the interesting one that columnar epithelium is its special habitat, not squamous epithelium or connective tissue. Gonorrhœa is thus cervical, uterine, tubal, urethral: not, strictly speaking, vaginal, peritoneal, vesical. It contrasts with septic organisms which flourish well on squamous epithelium. It is alleged that some of the sequelæ of gonorrhœa can only be accounted for by a form of mixed infection, *i.e.* where a septic organism has been superadded to the gonorrhœal. This has been found to be the case in abscesses of Bartholin's gland and in suppurative parametritis.

Metschnikoff's theory of inflammation applies well to gonorrhœa. We are to regard the gonococci as the invading army; the tissues, and more especially the leucocytes, as the defenders. As the disease advances the leucocytes capture the gonococci, expelling them in pus cells. Gradually the leucocytes conquer until the disease ends with inflammatory sequelæ and few gonococci. This accounts well for all phases of the disease as well as for the difficulty with which gonococci are found in tubal mischief due to gonorrhœa.

Gonorrhœa is thus a progressive local disorder due to the presence of a definite micro-organism which may exist for long in the male urethral tissues (*latent*), *and may infect a healthy mucous membrane virulently when its action on its original habitat is trifling.*

Course in the female. When a woman is infected from an acute or subacute gonorrhœa of the male, she has ordinary gonorrhœa as usually described.

The prognosis in such a case depends on the extent to which it spreads, and is serious when it becomes uterine or tubal.

When the gonorrhœa is *latent* in the male we then get a case in many respects typical. The woman will usually give a history of good menstrual health prior to marriage. At a varying period after marriage she suffers from dysmenorrhœa, menorrhagia often, as well as pains in the iliac regions. Sterility is commonly the rule. There may be a history of vesical discomfort after marriage, but usually the women do not think of infection as the source of the mischief.

On local examination there may be slight catarrh of the Bartholinian ducts, catarrh of the cervix, pelvic peritonitis in varying amount (acute, recurrent, or chronic) or such an amount of tubal mischief as to cause distinct lateral or posterior swellings. For diagnosis of these several conditions the student is referred back to the chapters of this Manual treating of such.

Prognosis. Unfavourable.

Treatment. It is evident that gonorrhœa in the male must be scrupulously treated—that before the patient is pronounced cured the discharge should be examined for gonococci, and specially that the patient should report himself prior to marriage for further examination.

The same holds good as to acute gonorrhœa in the female. The parts should be carefully disinfected with corrosive sublimate (1-2000), the patient being chloroformed if necessary in order that the sublimate solution be thoroughly rubbed in to the vulva and vagina. When the gonorrhœa is cervical, the same may be done, but there is more risk of doing harm and adding a mischievous septic organism to the gonorrhœal one.

In the form often induced by latent gonorrhœa heroic treatment by disinfection is impossible, and therefore palliative treatment is best, as well as great attention to the general health. When distinct tubal mischief is present, removal of the appendages is indicated.

For Examination of Gonococci in Pus.—Clean two cover glasses and place a drop of pus on one. Put them in apposition and then separate them so as to get a thin film of pus on each. Dry above spirit lamp and apply a drop of methyl-violet stain. Drain off superfluous fluid with bibulous paper and again dry above lamp. Wash in distilled water, dry, and mount in Canada balsam.

Examine with good microscope, oil immersion lens and Abbé's condenser.

Gram's method does not stain gonococci, and thus, according to Roux, we have a further test.

CASE-TAKING.

LITERATURE. *Emmet*—Gynecology, p. 57 : London, 1880. *Simpson, A. R.*—Contributions to Obstetrics and Gynecology, Method of Case-Taking in Gynecology, p. 317.

It is of importance to give some hints as to case-taking or the investigation of cases of diseases of the female sexual organs.

In hospitals, some form of case-taking card is usually employed; and we purpose describing the method of case-taking adopted by Professor Simpson in the Buchanan Ward (for the Diseases of Women) in the Edinburgh Royal Infirmary (see page 672).

We have drawn up a schedule[1] based on this card which will be found very convenient, either in private or in dispensary practice, for recording gynecological cases.

Our first object is to learn all we can from the patient herself. This information is considered under six heads and comprised under the term ANAMNESIS, a convenient word, which literally means a "statement of what she recollects."

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[1] Supplied by Messrs W. & A. K. Johnston, Edinburgh, in separate sheets, or in book-form.

The questions asked under "Sexual History" need little explanation. In regard to Menstruation as well as abnormal hæmorrhage, we may note that when either follows Amenorrhœa of some weeks' or months' duration it makes us suspect abortion. Hæmorrhage coming on after the menopause usually indicates cancer, especially if followed by fœtid discharge (*v.* p. 474); patients may complain of bleeding after coitus (p. 474), which is often an early sign of carcinoma. As to Dysmenorrhœa we should note whether the pain is before, during, or after the flow; we should also enquire as to clots or shreds discharged, and the latter should be examined microscopically. For the various conditions with which Amenorrhœa, Menorrhagia and Dysmenorrhœa are associated, see Index of Subjects under these heads and Chap. L.

CASE-TAKING CARD.

ANAMNESIS.

1. Name; Age; Occupation; Residence; Married, Single, or Widow; Date of Admission.

2. Complaint and Duration of Illness.

3. General History of—(*a*) Present attack; (*b*) Previous Health; (*c*) Diathesis; (*d*) Social Condition and Habits; (*e*) Family Health.

4. Sexual History.

- (1) *Menstruation*—
  - *A.* Normal—(*a*) Date of Commencement; (*b*) Type; (*c*) Duration; (*d*) Quantity; (*e*) Date of Disappearance.
  - *B.* Morbid—(*a*) Amenorrhœa; (*b*) Menorrhagia; (*c*) Dysmenorrhœa.
- (2) *Intermenstrual Discharge*—(*a*) Character; (*b*) Quantity.
- (3) *Pareunia.*
- (4) *Pregnancies*—(*a*) Number; (*b*) Dates of First and Last; (*c*) Abortions; (*d*) Character of Labours; (*e*) Puerperia; (*f*) Lactations.

5. Local Functional Disturbances—(*a*) Bladder; (*b*) Rectum; (*c*) Pelvic Nerves and Muscles.

6. General Functional Derangements—(*a*) Nervous System; (*b*) Respiratory System; (*c*) Circulatory System; (*d*) Digestive System; (*c*) Emunctories.

PHYSICAL EXAMINATION.

1. General Appearance and Configuration.

2. Mammæ.

3. Abdomen—(*a*) Inspection; (*b*) Palpation; (*c*) Percussion: (*d*) Auscultation; (*e*) Mensuration.

4. External Pudenda.

5. Per Vaginam—(*a*) Orifice; (*b*) Walls and cavity; (*c*) Roof; (*d*) Os and Cervix Uteri.

6. Bimanual Examination (Abdomino-vaginal, Recto-vaginal, Abdomino-rectal, Abdomino-recto-vaginal, Abdomino-vesico-vaginal)—

- (1) *Uterus*—(*a*) Size; (*b*) Shape; (*c*) Consistence; (*d*) Sensitiveness; (*e*) Position; (*f*) Mobility; (*g*) Relations.
- (2) *Fallopian Tubes.*
- (3) *Ovaries* — (*a*) Size; (*b*) Situation; (*c*) Sensitiveness.
- (4) *Peritoneum and Cellular Tissue.*
- (5) *Bladder.* (6) *Rectum.* (7) *Pelvic Bones.*

7. Use of—(*a*) Speculum; (*b*) Volsella; (*c*) Sound; (*d*) Curette; (*c*) Aspiratory Needle; (*f*) Tent.

8. Physical Changes in—(*a*) Nervous, (*b*) Respiratory, (*c*) Circulatory, (*d*) Digestive, (*e*) Emunctory Organs; (*f*) Skin; (*g*) Bones.

DIAGNOSIS.
PROGNOSIS.
TREATMENT.
PROGRESS AND TERMINATION.

Intermenstrual discharge. Ascertain its colour; its amount—Whether it requires the use of diapers; and whether it be fœtid, watery, or acrid. Leucorrhœa is present in vaginitis (p. 528), cervical catarrh (p. 308), endometritis (p. 323), and wherever there is secondary catarrh of the uterine mucous membrane as in retroflexion (p. 366) and uterine polypi (p. 453); it is also present in Chlorosis and Phthisis. Fœtid Leucorrhœa is characteristic of Carcinoma, whether affecting the cervix (p. 474) or body of the uterus (p. 502); in Sarcoma, it is not fœtid till the later stages (p. 508). For other references to Leucorrhœa, see Index of Subjects.

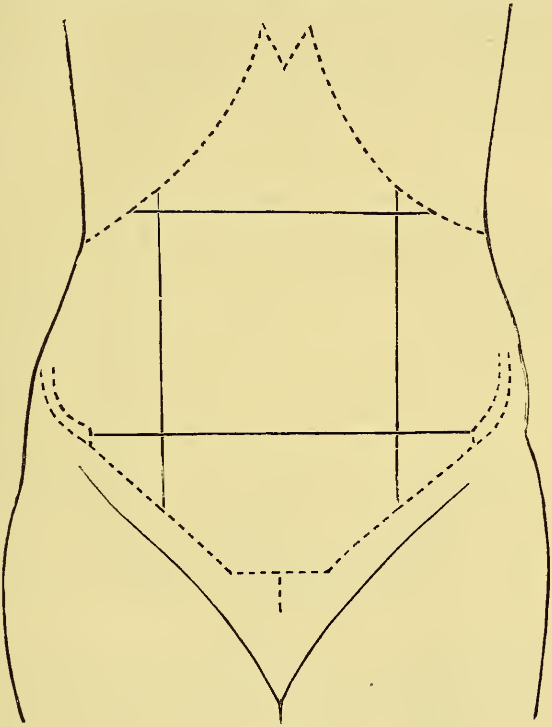

Fig. 397.

Outline Diagram of Abdomen for recording position of tumours relative to the body landmarks.

Pareunia. This refers to the absence or presence of pain during coitus (*v.* p. 531). It is enquired into only in special cases, or when the patient complains of the pain. For conditions producing dyspareunia, see Index of Subjects and page 531.

Physical Examination. The *general appearance* and *configuration* should always be noted. The sallow look of the dyspeptic and constipated, yellow appearance of the chlorotic, pinched face of the patient with ovarian cyst, are in some cases helpful in giving the hint as to the line of enquiry. The student should always note anything in the appearance or configuration which may enable him to recognise the diathesis of the patient. It is of importance to ascertain the occurrence of the gouty diathesis in a case of dysmenorrhœa, the tubercular diathesis in chlorosis, and the strumous in syphilis. The physician will be puzzled by the varied complaints of the patient over some slight pelvic inflammatory condition, unless he note the thin and anxious face of a patient of nervous temperament. Information gained in this way is valuable, but must be used with discrimination. Thus cancerous patients are often florid enough, while a sallow cachectic-looking woman may have some insignificant lesion.

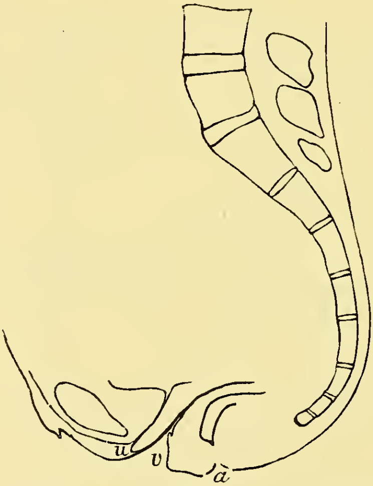

Fig. 398.
Outline Diagram of Pelvis for filling in Position of Uterus or Tumours (*A. R. Simpson*).

Mammæ. Note whether virginal, or those of Pregnancy or Lactation.

The *abdomino-vaginal examination* is the ordinary Bimanual. The abdomino-vesico-vaginal is a rare form but useful in some cases (p. 600). The *tent* is not used as a mere diagnostic except in the case of tumours in the cavity of the uterus.

Prognosis. A great deal depends on this. Thus we have to tell the patient whether her lesion is serious or slight, whether she will get well soon, or if her trouble is chronic but not dangerous. Unless she is told that it is chronic, she may ultimately come to the conclusion that its nature has been misunderstood by the physician. Prognosis is often difficult to give and should always be cautious, especially as to sterility.

Treatment. In no class of cases has the physician to be so careful not to do harm by his treatment. All operations should be carefully considered, and only undertaken when we feel fairly confident they will benefit and not make the patient worse. The great success of peritoneal operations is now undoubted; but the question as to the actual good resulting from repeated cauterisation of the uterine mucous membrane, division of the cervix, stitching of the cervix, etc., is more *sub lite* than is admitted in many text-books. The problem of how to remove cervical cancer without risk to life and with a fair hope of its non-recurrence is at present being worked out. Unfortunately the patient has frequently a return of the disease.

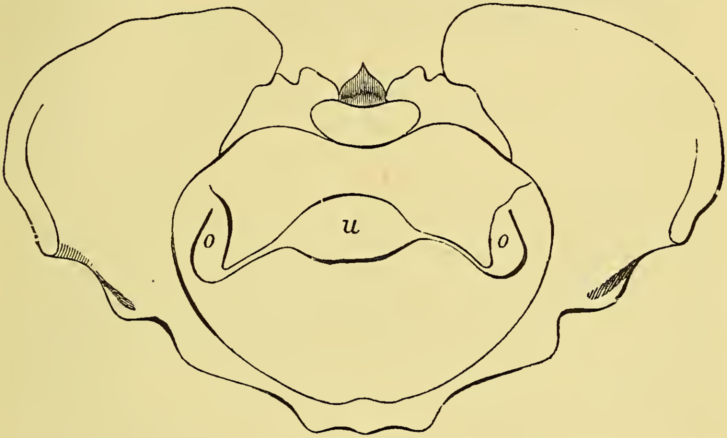

Fig. 399.

Outline Diagram Pelvis as seen through the brim, to fill in position of Tumours relative to Uterus (*Schultze*).

SOURCES OF GYNECOLOGICAL LITERATURE.

At the beginning of each subject we have already given a summary of the literature to which we were indebted. The literature given, therefore, represents what we considered important, and what we had in most cases personally studied.

Gynecological Literature is so extensive that a full resumé of it would have occupied several times the space we have allotted to the whole subject. We wish however to point out here the sources, so that any practitioner who wishes to ascertain the best books and monographs on any special subject may know how and where to begin his search.

The sources of Gynecological Literature are threefold :—

I. Catalogues, Dictionaries;
II. The larger Text-books of Gynecology;
III. Articles and Abstracts in the various Gynecological quarterlies, monthlies, and weeklies, with Retrospects and Jahrbücher.

I. CATALOGUES, DICTIONARIES.

(1.) *Index-Catalogue of the Library of the Surgeon-General's Office, U.S.A.* Washington Government Printing Office. In this splendid work, the authors and works are arranged alphabetically; its value cannot be overrated.
(2.) *Nouveau Dictionnaire de Médecine et de Chirurgie pratique:* Paris, J. B. Bailliére et Fils.
(3.) *Dictionnaire Encyclopédique des Sciences Médicales:* Asselin et Cie, Paris.
(4.) *Real-Encyclopädic der gesammten Heilkunde:* Wien.
Wood's Cyclopædia.
Annual of the Universal Medical Sciences (edited by Sajous): Philadelphia.
Buck's Reference Handbook of the Medical Sciences: New York.

II. LARGER MODERN TEXT-BOOKS OF GYNECOLOGY.

ENGLISH.

Barnes—Diseases of Women: London, J. & A. Churchill.
Byford—Medical and Surgical Treatment of Women: Philadelphia.
Duncan, Matthews—Diseases of Women: London, Churchill.
Edis—Diseases of Women: London, Smith, Elder, & Co.
Emmet—Principles and Practice of Gynecology: Philadelphia, Lea's Son & Co.
Goodell—Lessons in Gynecology: Philadelphia, Brinton.
Hewitt—The Diseases of Women: London, Longmans, Green & Co.
Mundé—Minor Surgical Gynecology: New York, Wood & Co.
Simpson, A. R.—Obstetrics and Gynecology: Edinburgh, A. & C. Black.
Simpson, Sir J. Y.—Diseases of Women: (edited by A. R. Simpson): A. & C. Black.
Sims, J. Marion—Uterine Surgery: London, Hardwicke.
Skene, A. J. C.—The Diseases of Women, Treatise on: London, Lewis.
Tait, Lawson—Diseases of Women: W. Wood & Co., New York.
The Pathology and Treatment of Diseases of the Ovary: Birmingham.
Diseases of Women and Abdominal Surgery, Vol. I.: Leicester, Richardson & Co.
Thomas—Treatise on Diseases of Women: London, Kimpton.
Thorburn—Diseases of Women: Griffin, & Co., London.
Wells, Sir T. S.—Ovarian and Uterine Tumours: London.
West (Duncan's Edition)—Diseases of Women: Churchill.

GERMAN.

Fritsch—Krankheiten der Frauen: Braunschweig.
Hegar und Kaltenbach—Die operative Gynäkologie, 3te, Aufl: Stuttgart, Enke.
Hofmeier—Grundriss der Gynäkologischen Operationen: Leipzig.
Schroeder—Handbuch der Krankheiten der weiblichen Geschlechtsorgane: Leipzig, Vogel.
Winckel—Lehrbuch der Frauenkrankheiten: Hirzel, Leipzig.

Handbuch der Frauenkrankheiten redigirt von Billroth u. Luecke: Enke, Stuttgart.

I. Band. Die Untersuchung der weiblichen Genitalien und allgemeine gynäkologische Therapie—*Chrobak.*
Die Sterilät der Ehe. Entwickelungsfehler des Uterus—*Müller.*
Die Lageveränderungen und Entzündungen des Uterus—*Fritsch.*
II. Band. Die Neubildungen des Uterus—*Gusserow.*
Die Krankheiten der Ovarien—*Olshausen.*
Die Krankheiten der Tuben, der Ligamente, des Becken-peritonäum und des Beckenbindegewebes, einschliesslich der Extrauterinschwangerschaft—*Bandl.*
III. Band. Die Krankheiten der weiblichen Brustdrüsen—*Billroth.*
Die Krankheiten der äusseren Genitalien und die Dammrisse—*Zweifel.*
Die Krankheiten der weiblichen Harnröhre und Blase—*Winckel.*
Die Krankheiten der Vagina—*Breisky.*

French.

Bernutz and Goupil—Clinical Memoirs on the Diseases of Women: Sydenham Society Tr.
Courty—Traité pratique des Maladies de l'utèrus, 2nd Edition: Paris, Asselin: also Dr. Agnes Maclaren's Translation, London.
De Sinéty—Manuel Pratique de Gynécologie: Paris, Doin.
Leblond—Traité élémentaire de Chirurgie gynécologique: Paris.
Tripier—Leçons cliniques sur les Maladies des Femmes: Paris, Doin.

III. Journals: Retrospects: Indexes: Jahrbücher.

American Journal of Obstetrics: New York, Wm. Wood & Co.
British Medical Journal: London.
Cassell's Year Book of Treatment.
Dublin Journal of Medical Science: Dublin, Fannin & Co.
Edinburgh Medical Journal: Edinburgh, Oliver & Boyd.
Glasgow Medical Journal: Glasgow, MacDougal.
International Journal of Medical Sciences: Lea's Son & Co., Philadelphia; Cassell & Co., London.
Lancet: London.
London Medical Record: Smith, Elder & Co.
Medical Press and Circular: London.
New York Medical Journal and Obstetrical Review: New York, Appleton & Co.; and London, Cassell & Co.
Reference Handbook of Medical Sciences: Wood & Co., New York.
Archiv für Gynäkologie: Berlin, Hirschwald.
Berliner klinische Wochenschrift.
Centralblatt für Gynäkologie: Leipzig, Breitkopf und Härtel.
Zeitschrift für Geburtshülfe und Gynäkologie: Stuttgart, Enke.
Archives de Tocologie et des Maladies des Femmes, etc.: Paris, Delahaye et E. Lecrosnier.
Annales de Gynécologie, Paris.
Annali di Ostetricia, Ginecologia e Pediatria: Milano, Pietro Agnelli.
Braithewaite's Retrospect: London, Simpkin, Marshall & Co.
Index Medicus: a monthly classified Record of the current Medical Literature of the World: G. S. Davis, Boston and Detroit, U.S.A.
Annual of the Universal Medical Sciences (Edited by Sajous): Davis, Philadelphia.
Schmidts's Jahrbücher: Leipzig.
Supplement to Ziemssen's Cyclopædia: London, Sampson Low, Marston, Searle, & Rivington.
Revue des Sciences Médicales: Paris, E. Masson.
Neale's Digest: London, Ledger, Smith & Co., 1882.
American Gynecological Transactions (Index at end): Boston, Houghton & Co.
London Obstetrical Transactions: Longmans, Green & Co.
Edinburgh Obstetrical Transactions: Oliver & Boyd.

In looking up literature on any special subject, first consult the literature given at the beginning of each chapter and then the index of Recent Gynecological Literature in the Appendix. The list of literature given in Billroth and Luecke's Handbuch, the Index Medicus, Neale's Digest and the U. S. A. Index Catalogue may also be consulted with advantage. The various Retrospects and Jahrbücher mentioned above give abstracts of the papers, and the French and German Cyclopædias give special exhaustive articles on each subject.

INDEX

OF

RECENT GYNECOLOGICAL LITERATURE.

INDEX

OF

RECENT GYNECOLOGICAL LITERATURE.

The following index aims at giving reference to all the important contributions to Gynecological Literature in the leading journals from January 1886,[1] the year in which the last edition of this Manual was published, to the end of 1888. The purpose is not to enable the reader to lay his hand on the papers of particular authorities (as this has already been done in the ordinary index of each Journal), but to gather together for him, from the best and most accessible Journals, all the material connected with the subject he may be reading up. The journals indexed are the following :—

British Medical Journal,	contraction	Brit. Med. Jour.;
Lancet,	,,	Lancet;
Edinburgh Medical Journal,	,,	Edin. Med. Jour.;
Glasgow Medical Journal,	,,	Glas. Med. Jour.;
Dublin Journal of Medical Science,	,,	Dub. Med. Jour.;
American Journal of Obstetrics,	,,	Amer. Jour. Obstet.;
Archiv für Gynäkologie,	,,	Archiv f. Gyn.;
Centralblatt für Gynäkologie,	,,	Centralb. f. Gyn.;
Zeitschrift für Geburtshülfe und Gynäkologie,	,,	Zeitsch. f. Geb. und Gyn.;
Volkmann's Sammlung,	,,	Volk. Samml.;
Archives de Tocologie,	,,	Archiv. de Toc.;
Annales de Gynécologie,	,,	Annal. de Gyn.;
Annali di Ostetricia,	,,	Annal. di Ostet.

The topics have to a certain extent been classified and grouped alphabetically. Under each topic the papers are arranged in order as they appear in each volume of the journal; this will enable the reader, as he happens to have access to the volumes of a journal, to refer to all the papers in it which bear on that topic. The catch-word indicates the drift of the paper, which in getting up the literature of a subject is more useful than the writer's name; in operations, however, the name of the operator is given.

Our aim has been to make an index which will give references to sources within the reach of the majority of practitioners. Transactions of Societies, containing papers in full, are not to be found in all libraries; hence we have preferred to give the reference to Journals which may perhaps only refer to the paper, and the reader desiring further information must go to the Transactions themselves. Reference to the Proceedings of the Societies and Associations will be found in the Journals as follows: London Obstetrical Society, British Gynecological Society, and many papers in other English Societies, *Brit. Med. Jour.* or *Lancet;* Edinburgh Obstetrical Society, *Edin. Med. Jour.;* Obstetrical Section of British Medical Association, *Brit. Med. Jour.;* Obstetrical Section of Academy of Medicine of Ireland, *Dub. Med. Jour.;* New York and Philadelphia Obstetrical Societies and American Gynecological Association, *Amer. Jour. Obstet.;* Société Obstetricale et Gynécologique de Paris, Société de Chirurgie, Académie des Sciences, Société médicale des Hôpitaux, in *Archiv. de Toc.* or *Annal. de Gyn.;* Gesellschaft für Geburtshülfe und Gynäkologie zu Berlin, and Gynecological Section of the Versammlung deutscher Naturforscher und Aertzte, in *Zeit. f. Geb. u. Gyn.*, *Archiv f. Gyn.*, or *Centralb. f. Gyn.*

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[1] The literature of the preceding three years will be found in the Third Edition.

INDEX OF RECENT GYNECOLOGICAL LITERATURE.

ABDOMINAL SURGERY.

BRIT. MED. JOUR. **1886,** I. 193, For small pelvic tumours by Cullingworth; 356, Removal of large fatty tumour of omentum by Meredith; 410, Ideal cholecystotomy; 936, 1042, Peritoneal surgery; 1063, 1109, 1167, Cases by Mayo Robson; 1169, Laparotomy for cystic myoma, Walter; 1170, Laparotomy for hydatid tumours. **1886,** II. 433, Extirpation of Cyst of omphalo-mesenteric duct by Schoad; 852, General principles in removal of uterine appendages. **1887,** I. 176, Puncture with aspirating needle; 355, 417, 480, 541, 592, 647, 697, Skene Keith's statistics of; 480, Ascites after laparotomy; 568, Exploratory laparotomy; 593, 698, 752, Ventrotomy as term for 'Abdominal Section;' 776, Sequel to gastro-enterostomy; 975, 1031, Abdominal section by Sir W. MacCormac for intra-peritoneal injury; 1000, Treatment of intra-peritoneal injury; 1178, Laparotomy in America. **1887,** II. 17, For renal hydatids by Imlach; 727, Puncture of the heart in chloroform poisoning; 829, Abdominal section by Lammiman for stoppage of the bowels; 1061, Laparotomy for peritonitis; 1442, Laparotomy in puerperal fever. **1888,** I. 128, Three unusual cases of abdominal section by Stuart Nairne; 136, Laparotomy by Clutton for obstruction from gall-stone; 711, Menstrual bleeding from a laparotomy scar; 932, Laparotomy by Von Dutel, for acute cystitis; 971, Section by Garrigues for ruptured uterus. **1888,** II. 172, Some aspects of; 938, Some points affecting the mortality of abdominal section; 1050, Laparotomy by Keetley for suppurative peritonitis; 1096, Lawson Tait's conclusions from a second series of one thousand sections; 1336, Abdominal section by M'Mordie for large fibroid; 1403, Flushing the peritoneum.

LANCET. **1886,** I. 343, Note on abdominal sections; 1222, Abdominal section by Wade, for ovarian and fibroid tumour at same time. **1886,** II. 669, Two cases of abdominal section by Underhill; 774, Three cases of section by Imlach. **1887,** I. 310, Section, by Mackay, for pelvic suppuration; 518, 568, An hundred consecutive sections, by Granville Bantock; 563, Inaugural address to Obstet. Soc. London; 586, Section, statistics of at Kieff; 622, Section by Elder, for pyosalpinx and sub-peritoneal myoma; 1134, Cases of section by Truman. **1887,** II. 205, 257, Sixty-four cases of section by Cullingworth; 860, Condition and management of the intestine after section; 1008, Seven consecutive laparotomies, by Balls-Headley; 1111, Supra-pubic incision by Gibbons and Parker, for removal of tumour from female bladder; 1263, Purgation during convalescence after section. **1888,** I. 268, Two cases of laparotomy by Homans, for tubercular peritonitis; 476, Review of three hundred and eighty-four laparotomies by Homans; 681, Section for extra-uterine gestation, by Rutherford Morison; 719, Section for peritonitis, by Smith and Burford; 919, Cæsarean section for impacted fibroid; 1132, Five cases of Section by O'Callaghan. **1888,** II. 675, Section by Lawson Tait, for congenital cyst of urachus; 803, 855, Second series of sections by Cullingworth; 817, Mortality of Abdominal Section; 964, Cases, by Neve; 1062, Section by Bull, for hydatid cyst of the liver; 1065, By Pepper, for double tubercular pyosalpinx and strangulated femoral hernia; 1170, Two cases of section by Mayo Robson for tubercular peritonitis.

EDIN. MED. JOUR. **XXXI.,** II. 1066, 1142, Lawson Tait on Abdominal Section; 1176, Treatment of fibromyomata by laparotomy. **XXXII.,** I. 212, Successful laparotomy by Wallace; 466, On the so-called laparotomy epidemic. **XXXII.,** II. 673, 736, Series of sections by Halliday Croom; 954, Intestinal obstruction after abdominal operations. **XXXIII.,** II. 1061, Deep-buried continuous animal suture in laparotomy. **XXXIV.,** I. 40, 146, Notes of a year's work in, Rutherford Morison; 117, 171, Twelve laparotomies by Brewis.

GLAS. MED. JOUR. **XXVIII.** 161, Thirty cases of section, by Cameron.

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BRIT. MED. JOUR. **1887,** I. 436, Report of the British Medical Association on cancer of the breast. **1887,** II. 174, Treatment of mastitis; 327, Ibid. by pressure. **1888,** I. 24, Tubercular tumour; 24, Spreading cancer of; 533, Villous carcinoma of right breast; 957, Large sarcomatous tumour; 1046, 1101, Carcinoma, operation by Macnamara; 1277, Alveolar sarcoma. **1888,** II. 775, Atrophy of inactive mammary gland; 857, Absence of mammary gland; 876, Absence; 1222, Sarcoma.

LANCET. **1887,** I. 72, Melanotic tumour; 628, Mammary tumours; 780, Treatment of mastitis; 1230, 1315, Removal of adenoma of breast. **1888,** I. 74, Spreading cancer of; 472, Villous cancer of; 690, Cancer, treated by erysipelas inoculation; 1258, Modelling clay in. **1888,** II. 1281, Inflammation and treatment by elastic pressure.

EDIN. MED. JOUR. **XXXIII.,** II. 1059, Electricity in atrophy.

DUB. MED. JOUR. **LXXXV.** 13, Treatment of mammary tumours.

AMER. JOUR. OBS. **1887.** 1104, Electrolysis for tumours. **1888.** 503, Very early removal of entire breast for "suspected" cancer, Janvrin.

CENTRALB. F. GYN. **XII.** 570, Tuberculosis.

ARCHIV. DE TOC. **1888.** 298, Septicæmia of mammary origin; 622, Supernumerary mammæ.

MASSAGE.

BRIT. MED. JOUR. **1886,** I. 926, Massage as a therapeutic agent; 1034, Massage and Assimilation. **1887,** II. 232, For severe hysteria; 502, In chronic dyspepsia and sleeplessness. **1888,** I. 1298, Three cases of. **1888,** II. 175, Colles on.

LANCET. **1886,** I. 982, Physiological effects. **1886,** II. 703, 795, Sturges on; 749, 845, Murrell on; 750, 894, Easton on; 795, Playfair on; 894, Little on. **1887,** I. 125, Physiological effects; 637, Effects on exhalations from lungs and skin. **1888,** I. 8, Limitations of the "Weir Mitchell Treatment;" 149, Correspondence on; 680, Atkin on; 921, As a curative agent; 1128, Severe cases of hysteria cured by massage, seclusion, and overfeeding.

EDIN. MED. JOUR. **XXXIII.,** I. 35, 119, Grant on.

GLAS. MED. JOUR. **XXX.** 470, Hünerfauth on.

DUB. MED. JOUR. **LXXXIII.** 381, Knight on.

CENTRALB. F. GYN. **XI.** 505, Resch on. **XII.** 201, Prolapse of uterus and; 481, Ibid.

MENSTRUATION AND OVULATION.

BRIT. MED. JOUR. **1886,** I. 114, Exploration of uterine cavity in menorrhagia; 201, Retention of; 539, Sudden death from hæmorrhage into abdominal cavity during; 800, Pulse during; 882, 980, Vicarious; 894, Influence of diabetes on. **1887,** I. 153, And phthisis. **1887,** II. 697, Treatment of the menopause; 1018, Morphinomania and; 1172, Metrorrhagia at the age of puberty. **1888,** I. 385, Case of early; 613, After hysterectomy; 666, Ibid.; 711, From a laparotomy scar; 960, Precocious puberty with tumour of right ovary. **1888,** II. 939, Vicarious.

LANCET. **1886,** I. 939, Connection between splenic tumour and. **1886,** II. 383, Case of early; 1173, After removal of uterus with appendages. **1887,** I. 1227, Occurrence of menorrhagia or metrorrhagia during febrile state. **1887,** II. 726, Time of commencement. **1888,** I. 41, Hæmorrhage in myxœdema; 882, Ovarian tumours and precocious puberty. **1888,** II. 939, After removal of both ovaries; 992, Ibid.; 1044, And the ovaries; 1204, Ibid.

EDIN. MED. JOUR. **XXXI.,** II. 786, A new explanation of; 1173, Relation to development of fœtus at term. **XXXII.,** I. 201, 263, Relation to goitre.

GLAS. MED. JOUR. **XXV.** 413, New explanation of. **XXVI.** 320, Vicarious, simulating pregnancy.

DUB. MED. JOUR. **LXXXII.** 254, Treatment of menorrhagia. **LXXXIII.** 279, Report on. **LXXXV.** 73, Change of the field of vision in. **LXXXVI.** 130, Effects on vision.

AMER. JOUR. OBS. **1886.** 99, Some facts learned from artificial repression; 141, Vicarious, simulating phthisis; 152, Persistent at seventy; 457, Ovulation during pregnancy; 481, Retention through imperforate hymen; 618, Menstrual epilepsy; 1263, Persistent after double ovariotomy. **1887.** 88, Vicarious; 110, Cause and purpose of; 158, Relation to sexual functions; 1068, Vicarious. **1888.** 612, Regular, after Tait's operation; 1138, Repression of as a curative agent in Gynecology.

ARCHIV F. GYN. **XXVIII.** 158, 508, Löwenthal on E. A. Feoktistow's "Some words on the causes and object of the menstrual process."

CENTRALB. F. GYN. **X.** 58, In relation to development of ovum; 117, Præcox; 205, Vicarious from ear; 289, Flesch on. **XII.** 305, At three years old; 360, After double ovariotomy.

VOLK. SAMML. No. 312, Nervous swelling of skin during menstruation and menopause.

ARCHIV. DE TOC. **1886.** 31, Double ovariotomy and; 433, Relation of diabetes to. **1887.** 337, Paralysis and menstrual disorders; 356, Early; 667, Report on; 913, Metrorrhagia at puberty.

ANNAL. DE GYN. **XXV.** 178, In Syria.

ANNAL. DI OSTET. **1886.** 248, Ovulation in pregnancy; 392, Ibid.

MICRO-ORGANISMS.

BRIT. MED. JOUR. **1887,** II. 166, Lawson Tait on development of surgery and germ theory; 929, Cultivation experiments with malignant new growths.

EDIN. MED. JOUR. **XXXI.,** II. 772, Germ theory of disease.

AMER. JOUR. OBS. **1888.** 781, In genital canal of healthy woman.

CENTRALB. F. GYN. **X.** 157, Gonococci in salpingitis. **XII.** 281, In genital canal of healthy woman.

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MISCELLANEOUS.

BRIT. MED. JOUR. **1886,** I. 181, Progress and work of the British Gynecological Society; 587, The advantage of straightening the uterus in cases of uterine hæmorrhage; 1053, 1095, 1154, Functional disorders of females. **1886**, II. 356, Certain operations ; 910, On certain mooted points in Gynecology ; 1028, Cardiac dilatation at puberty and its frequent occurrence in girls ; 1224, Report of Liverpool Hospital for Women ; 1253, Summary for 1886. **1887**, I. 145, On some pending questions in Gynecology ; 259, 325, 370, Evolution in pathology; 567, 984, 1148, Exceptional symptoms and rare forms of disease ; 613, 827, Parotitis after injury to abdomen and pelvis ; 1238, Peculiar anomaly of the sexual organs. **1887**, II. 77, Tumours of the umbilicus ; 376, 475, Papers and discussions at Brit. Med. Assoc. in 1887 ; 421, Hydrocele in the female ; 478, Artificial immunity to septicæmia ; 509, Hydrocele in the female ; 672, Ill-health in female servants and shop-assistants ; 912, Hydrocele in female ; 1280, Fatty degeneration of the heart for intra-abdominal pressure ; 1304, Experiments in telepathic medication ; 1350, Paralysis of abdominal muscles ; 1377, Hydrocele in the female ; 1379, Treatment of habitual constipation ; 1387, Congenital sacral tumour ; 1413, 1442, Retrospect for 1887. **1888**, I. 132, Treatment of habitual constipation ; 252, Myxœdema in married women ; 303, Etiology of pelvic disease in women ; 303, Dublin schools and their teaching ; 368, Removal of a hairpin from the peritoneum ; 855, Cases of acromegaly ; 899, Removal of hairpin from female bladder ; 971, Micro-organisms in female genital tract ; 1212, 1374, Rare diseases and exceptional symptoms ; 1387, Extra-peritoneal cysts. **1888**, II. 1458, Retrospect of Gynecology for 1888.

LANCET. **1886**, I. 19, Recent progress ; 86, 130, 227, 374, Relation of parotid to generative organs ; 111, Osteomalacia ; 896, Inheritance of acquired pathological properties ; 943, Photographing the uterine cavity. **1886**, II. 304, 375, 422, 470, 558, 603, 1147, Hospital for Women in Liverpool. **1887**, I. 82, Hospital for Women in Liverpool ; 445, "Erythromelalgy ;" 482, Phagocytes ; 563, Inaugural address to Obstet. Soc. Lond. **1887**, II. 704, Pathogenesis of disease in women ; 1239, Alexander's Operation in Belgium. **1888**, I. 57, 163, 209, 425, Some points in surgery of urinary organs ; 72, Influence of sex on health and disease ; 880, Ovarian tumours and precocious puberty. **1888**, II. 336, Genito-urinary surgeons.

EDIN. MED. JOUR. **XXXI.**, II. 623, Rare cases of malignant disease of the female sexual organs ; 765, Simple means of washing out the uterus ; 883, 1173, Nature of secretions of female genital organs. **XXXII.**, I. 55, 169, 287, Unsuccessful Case of Alexander's operation. **XXXII.**, II. 585, Halliday Croom's introductory address to Edin. Obstet. Soc. ; 865, 938, Clinical teaching. **XXXIII.**, I. 576, Report on genito-urinary diseases. **XXXIII.**, II. 838, Etiology of tumours ; 864, Juniper catgut ; 873, 1127, Alcoholism in Gynæcology ; 933, 935, Cases of myxœdema. **XXXIV.**, I. 47, Halliday Croom's valedictory address to Edin. Obstet. Soc. ; 512, Underhill's Introductory address to Edin. Obstet. Soc. ; 566, Influence of pregnancy on pelvic disease.

GLAS. MED. JOUR. **XXV.** 76, Shortening of the round ligament. **XXVII.** 314, Alterations of the ganglion of Frankenhaüser (cervico-uterine ganglion) in simple and parametric atrophy ; 408, Gynecological cliniques of Vienna and Berlin.

DUB. MED. JOUR. **LXXXI.** 18, 164, Recent progress in Gynecology. **LXXXII.** 92, Climacteric diabetes. **LXXXIV.** 422, 472, Report on Rotunda Hospital for three years to 3rd Nov. 1886. **LXXXV.** 381, Priority in flap-splitting ; 392, Report on Rotunda hospital for year ending 3rd Nov. 1887. **LXXXVI.** 73, Discussion on preceding report.

AMER. JOUR. OBS. **1886.** 187, Local *v.* general treatment in gynecology ; 203, Drainage-tube passed *per rectum ;* 316, Methods of diagnosis ; 387, Report on gynecology in France ; 395, 1038, Report on gynecology in Germany ; 468, A morning with August Martin ; 548, Diabetes in connection with uterine disease, menstruation, and pregnancy ; 765, Impressions of German and English gynecology ; 951, Pressure in Davidson's syringe ; 1211, Report on gynecology ; 1262, Perforation of uterine wall by spoon saw ; 1292, Gynecological cabinet. **1887.** 561, 685, Dry treatment in gynecology ; 707, Treatment of pain and insomnia from gynecological causes ; 724, Gynecology in France ; 984, Chiara's clinic ; 1064, Vaginal injections in Sims' posture ; 1091, Drainage *per vaginam ;* 1113, Remote results of shortening the round ligament ; 1213, Observations in Vienna. **1888.** 13, Removal of vaginal tampon twenty-nine years after insertion ; 113, 187, Chronic anæmia and wasting in newly married women ; 133, A new stitch ; 599, Technique of gynæcological surgery, S. Sutton ; 694, 737, Cases in practice ; 1047, President's address to American Gynecological Society, Battey ; 1064, President's address to American Association of Obstetricians and Gynecologists, Taylor ; 1094, Diseases of the skin associated with sexual disorders in the female.

ARCHIV F. GYN. **XXXII.** 505, Laxity of abdominal walls. **XXXIII.** 312, Woman with rudimentary sexual organs.

CENTRALB. F. GYN. **X.** 20, Disorders of early life ; 65, Floating spleen ; 122, Diabetes in relation to female sexual organs ; 204, Dilatation of uterus ; 297, Clinical notes ; 606, Baths in women's diseases ; 745, Tearing out of uterus and destruction of recto-vaginal septum, Schmalfuss. **XI.** 70, Genital tuberculosis ; 457, Rubber-bags in gynecology ; 633, 841, Atrophy of genital apparatus in morphia excess ; 678, Cysts of mesentery ; 681, Plugging of vagina ; 744, Female sexual organs and other organs ; 855, Extirpation of spleen, Orlowski. **XII.** 338, Extirpation of spleen, Liebman ; 406, Internal erysipelas ; 499, Atrophy of genitals in diabetes mellitus.

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VOLK. SAMML. No. 321, Source and Treatment of bleeding in gynecology.

ARCHIV. DE TOC. **1887.** 529, Tuberculosis in early life.

ANNAL DI OSTET. **1886.** 178, Abnormal fat production. **1888.** 408, Diffuse muscular spasm.

NERVOUS AFFECTIONS.

BRIT. MED. JOUR. **1886**, I. 1056, Uterine neuroses. **1886**, II. 130, Intense mammary neuralgia ; 147, 409, Uterine neuroses ; 546, Tympanitis in hysterical women ; 650, Hysterical apoplexy ; 786, Hysterical amaurosis ; 837, Hæmatemesis in hysterical patients ; 853, Neurasthenia ; 947, Asphalgesia in the hysterical. **1887**, I. 64, Nymphomania ; 122, Boldo-glucine in nervous insomnia ; 133, Transmission of hysterical symptoms by means of a magnet ; 905, Statical electricity in hysteria ; 1016, Vitiligo as a symptom ; 1228, Prostitution and insanity (nervous and mental affections). **1887**, II. 60, Uterine neuroses ; 93, Hydro-electric baths in ; 126, Rare forms ; 150, Hysterical pemphigus ; 232, Treatment of severe hysteria ; 430, Antifebrin in ; 1071, Hypnotism in hysterical vomiting; 1304, Hypnotism in hystero-epilepsy. **1888, I.** 40, Antipyrin in nervous drowsiness ; 100, Treatment of epilepsy by antipyrin ; 156, Hysteria and syphilis ; 300, Indications of neurasthenia contrasted with those of hysteria ; 323, Antipyrine in epilepsy ; 348, Case of melancholia ; 358, Tait's operation, by Lawson Tait, for intense hystero-epilepsy ; 377, Nomenclature of neurasthenic conditions ; 417, 418, Some cases of hysteria ; 418, Death with symptoms of hysteria ; 700, Hystero-epilepsy treated by removal of uterine appendages, by Imlach ; 1007, Cases of ; 1012, Functional eye symptoms in ; 1082, Actual cautery for epilepsy.

LANCET. **1886, I.** 123, Treatment of hysterical vomiting ; 351, Hysterical pyrexia ; 940, Hysterical fever ; 1055, 1105, 1151, Functional disorders of females. **1886, II.** 397, Hysteria or tetanus ; 457, Neurasthenia ; 686, Hysterical apoplexy ; 837, Spontaneous shedding of nails in hysteria ; 882, Hysterical contracture ; 1170, Hysterical affections. **1887, I.** 389, Neurasthenia not hysteria ; 924, Psychic and nervous influences in disease. **1887, II.** 577, Hysteria and traumatism ; 726, Hystero-epilepsy cured by a sham operation ; 1112, Hysterical hyperpyrexia ; 1213, Hystero-epilepsy, treated by Tait's operation. **1888, I.** 224, Improper use of term "hysteria;" 236, Hysteria; 391, Neurokinesis, Neurasthenia, Hysteria ; 422, Cases of hysteria ; 423, Functional neuroses simulating hysteria ; 516, 583, 597, Anorexia nervosa ; 613, Case of anorexia nervosa vel hysterica ; 817, Note on ibid. ; 818, Case of ibid. ; 842, Abdominal pressure in hysteria ; 899, 949, 1002, Anorexia nervosa ; 1128, Severe case of hysteria cured by massage, seclusion, and over-feeding ; 1184, Sympathetic nervous system in acute disease.

EDIN. MED. JOUR. **XXXII., II.** 654, Opinion of leading authorities on castration in mental and nervous diseases ; 952, Treatment of hysterical attack. **XXXIII., II.** 1060, Nervous symptoms from displacement of uterus and appendages.

GLAS. MED. JOUR. **XXV.** 489, Treatment of neuralgia and painful affections ; 491, Treatment of hysteria by compression of nerves. **XXVI.** 230, Cardiac neurasthenia. **XXVIII.** 398, Oöphorectomy for.

DUB. MED. JOUR. **LXXXI.** 329, Report on.

AMER. JOUR. OBS. **1886.** 135, Dependent on ovarian displacement ; 154, Hystero-catalepsy of obscure origin ; 390, Myelitis following pelvic cellulitis ; 785, Cardiac neuroses connected with ovarian and uterine disease ; 863, Hysteria in a young girl. **1887.** 223, Reflex gastric neuroses due to uterine disease. **1888.** 410, Laparotomy for hystero-epilepsy, Lee; 435, Oöphorectomy for epilepsy, Reamy ; 993, Origin of psychoses following operations on the female genital apparatus ; 1185, Perityphlitic abscess originating in typhlitis.

ARCHIV F. GYN. **XXIX.** 333, Oöphorectomy in epilepsy ; 333, Ibid. in neuroses. **XXXII.** 457, Psychoses arising from operations on female genitals.

CENTRALB. F. GYN. **X.** 834, Nervous symptoms in disease of female sexual organs. **XI.** 418, 442, Neuroses in relation to gynecological operations ; 746, Tympanitis in hysterical women. **XII.** 50, Functional neuroses in female sex and relation to sex troubles; 137, Hysteria.

ARCHIV. DE TOC. **1887.** 289, Castration and ; 644, Uterus in morphinomania ; 706, Removal of ovaries in.

OÖPHORECTOMY.

BRIT. MED. JOUR. **1886, I.** 1065, By Edis. **1887, I.** 122, In neurotic women ; 210, Cases of, by Hume ; 1211, Unsatisfactory results of unilateral removal. **1888, I.** 538, By Lunn, for uterine fibroids ; 546, And the development of the genital tract ; 861, Abortion after. **1888, II.** 77, By Lunn, for bleeding fibroid.

LANCET. **1886, I.** 34, By Roth, first in Cagliari of Sardinia ; 353, By Knowsley Thornton, during pregnancy ; 963, Removal of both ovaries, by Tait. **1886, II.** 453, Spaying ; 470, Ibid. ; 557, Ibid. **1887, I.** 26, By Brown ; 104, For hysteria, by Terrier ; 126, Removal of cystic ovaries for dysmenorrhœa, by Wm. Duncan ; 183, Use of the word "spaying ;" 638, Spaying in the States ; 876, Successful removal of right ovary, by Gervis, for cystic disease nine months after operation for hydrosalpinx. **1887, II.** 603, By Treves, with removal of kidney. **1888, I.** 674, By Lunn, for bleeding fibroid of uterus ; 1155, 1270, Removal of diseased ovaries. **1888, II.** 667, By M'Mordie, of displaced cystic ovary causing persistent pelvic pain ; 1283, Lessons in.

GLAS. MED. JOUR. **XXVIII.** 398, In neurotic affections ; 398, Is it curative? 399, Of cystic ovaries, for dysmenorrhœa, by Wm. Duncan.

AMER. JOUR. OBS. **1886.** 56, Of cystic ovaries with pyosalpinx, by Janvrin ; 80, Case, by Montgomery ; 81, Supravaginal, for fibroid, by Montgomery ; 137, *versus* Hysterectomy for myofibromata ; 166, For ovaralgia, by Goodell ; 167, For bleeding fibroid, by Goodell ; 277, Rare case of multiple neuromata following ; 483, In fibroids ; 613, Case of Hegar's operation, Lee ; 1172, By Price, for uterine fibroid. **1887.** 172, Of cystic ovary ; 193, Case, by Thompson ; 732, For hysteromania. **1888.** 335, For fibroid ; 435, For epilepsy, Reamy ; 710, For fibroids ; 872, Per vaginam, Byford ; 1115, Castration in Osteomalacia, Fehling ; 1189, A year's work in, Goodell.

ARCHIV F. GYN. **XXIX.** 183, Observations on ; 333, In epilepsy ; 333, In neuroses **XXXII.** 506, In osteomalacia, Fehling.

CENTRALB. F. GYN. **X.** 40, With supravaginal extirpation of uterus for fibromyoma, Vogelius ; 62, In uterine myoma, Fraipont ; 257, In fibro-myoma ; 580, Of small ovaries. **XI.** 698, Castration, Hegar. **XII.** 849, Castration, Willers.

ZEITSCH. F. GEB. UND GYN. **XIII.** 325, And neuroses. **XIV.** 106, Myomotomy and, in fibroids, Wehmer.

ARCHIV. DE TOC. **1886.** 28, Ovario-hysterectomy, Terrier. **1887.** 289, And nervous affections of women ; 397, Castration, Hergott ; 658, By Championnière ; 706, In nervous affections.

ANNAL. DI OSTET. **1887.** 155, For fibroids. **1888.** 1, For fibroid, Fasola ; 49, Vomiting and meteorismus after.

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BRIT. MED. JOUR. **1886, I.** 16, Ruptured, during operation, by Aveling ; 1074, Specimen. **1887, I.** 799, Parasites in. **1887, II.** 510, Specimen ; 1050, Ovariotomy for ; 1157, With twisted pedicle ; 1282, With twisted pedicle. **1888, I.** 21, Suppurating ; 22, Causing uterine hæmorrhage ; 249, With hæmatosalpinx ; 249, Cystic disease of ovary ; 303, Large multilocular ; 906, In pregnancy ; 960, Associated with precocious puberty. **1888, II.** 125, Hydramnios simulating ; 1049, Specimens ; 1049, With twisted pedicle ; 1221, Ibid. ; 1395, Papillary.

LANCET. **1886, I.** 221, Discharge of cyst *per rectum ;* 353, Specimen of papilloma ; 744, With hæmatosalpinx ; 1162, Recurrent ; 1222, Removal of, by Knowsley Thornton. **1886,** II. 672, Spontaneous cure. **1887,** I. 122, Complicating pregnancy; 527, Specimen; 1085, Following injury; 1087, Multilocular; 1139, Ibid.; 1186, Tubo-ovarian. **1887,** II. 117, Discussion on tubo-ovarian cysts; 417, Report on case; 1164, Herman on. **1888,** I. 74, Causing uterine hæmorrhage; 829, Cases of. **1888,** II. 618, Recovery from; 667, Removal of a displaced cystic ovary, by M'Mordie; 1281, Cases.

EDIN. MED. JOUR. **XXXI.,** II. 788, One hundred and twelve consecutive operations for ovarian and parovarian cysts without a death, by Lawson Tait; 965, With twisted pedicle. **XXXII.,** I. 272, Enlarged cystic ovary. **XXXIII.,** I. 73, Cases. **XXXIV.,** I. 275, 435, Pathology of cystic ovaries.

GLAS. MED. JOUR. **XXVIII.** 399, Cystic ovaries removed for dysmenorrhœa, Wm. Duncan.

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AMER. JOUR. OBS. **1886.** 270, Specimen with pyosalpinx; 489, Unusual; 623, Case; 828, Weighing 100 lbs.; 1166, Proliferating; 1170, Case; 1261, Discovered soon after delivery; 1278, Monocyst; 1280, "Bursting" cyst. **1887.** 178, Intra-ligamentous; 309, Proliferating; 310, In broad ligament; 311, Suppurating adenoma; 312, Unilocular, with corpus luteum; 734, With papillomatous degeneration of internal surface; 752, Simulating ectopic gestation; 872, Large, cured by drainage and obliteration of cavity Parish; 878, With twisted pedicle; 1283, Simple ovarian cyst. **1888.** 1, Intra-ligamentous; 62, Multilocular colloid; 528, Case of traumatic hæmorrhage into an; 530, Small suppurating, so-called ovarian abscess; 614, Diagnostic aspiration of; 710, Proliferating; 711, Intra-ligamentous; 732, Strangulated; 1174, Double; 1205, With a subserous fibromyoma of the cervix; 1307, Multilocular.

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ANNAL. DI OSTET. **1886.** 168, Torsion of pedicle; 197, 266, Operation for intra-ligamentous, Fasola.

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BRIT. MED. JOUR. **1886,** I. 18, Sarcoma of; 18, Double-fused ovarian sarcoma; 606, Malignant. **1886,** II., Myxo-carcinoma. **1887,** I. 1164, Of left ovary. **1888,** I. 648, Sarcoma. **1888,** II. 79, Sarcoma; 1049, Sarcoma.

EDIN. MED. JOUR. **XXXIII.,** II. 755, Myxomatous.

GLAS. MED. JOUR. **XXIX.** 79, Peculiar teratoma.

AMER. JOUR. OBS. **1886.** 528, Advisability of operating in cases of malignant; 1265, Fibroid; 1277, Fibro-sarcomatous. **1887.** 1187, Papilloma; 1291, Spindle-celled sarcoma. **1888.** 323, Fibroma; 1197, Sarcoma with half-twisted pedicle.

ARCHIV F. GYN. **XXXIII.** 1, Origin of epithelial tumour of; 327, Malignant.

CENTRALB. F. GYN. **X.** 183, Malignant; 569, Dermoid carcinoma; 582, Myxoma; 644, Enderlin on. **XI.** 403, Malignant.

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BRIT. MED. JOUR. **1886,** I. 264, Papillomata fungating into peritoneum. **1887,** I. 825, Pathology of chronic inflammation of; 1164, Papilloma. **1887,** II. 673, Inflammatory condition of. **1888,** I. 416, Papilloma of tubes and ovaries; 1389, Prolapse of ovary. **1888,** II. 940, Abscess of, with uterine fibroid.

LANCET. **1886,** I. 402, Displacements; 973, Adenoma of. **1886,** II. 398, Cystic degeneration; 715, 767, Connection with pulmonary phthisis. **1887,** I. 312, Hernia of ovary. **1888,** I. 31, Specimens of papilloma; 879, Malignant disease of. **1888,** II. 769, Blood calculi in both; 914, Tubercle; 1034, Oöphoralgia treated by Faradisation.

EDIN. MED. JOUR. **XXXII.,** I. 167, Series of diseased.

GLAS. MED. JOUR. **XXIX.** 76, Specimens illustrative of.

DUB. MED. JOUR. **LXXXI.** 111, More Madden on displacements.

AMER. JOUR. OBS. **1886.** 292, Follicular degeneration; 413, Papilloma of the hilum; 503, Hæmatoma with adherent Fallopian tube; 609, Abscess of one ovary with double pyosalpinx; 613, Case of Hegar's operation for, Lee; 616, Double cystoma ovarii papillare, laparotomy, by Lee; 1273, Abscess with cyst of right broad ligament. **1887.** 105, Abscess; 1196, Absence of both; 1227, Malignant growths and surgical treatment; 1282, Photograph of diseased tubes and ovaries. **1888,** 111, Diagnosis and treatment of adhesions in prolapse; 434, Prolapsus; 485, Martin's method of operating in high-seated abscesses involving the ovaries, tubes and intestine; 512, Abscess; 526, Ibid.; 1188, Specimen of diseased by Gonorrhœal infection; 1214, Enormous sarcoma implicating both ovaries and one tube in a young girl; 1274, Abscess; 1289, Sarcoma.

ARCHIV F. GYN. **XXXII.** 234, Cavernous metamorphosis of. **XXXIII.** 329, Encapsuled.

ANNAL. DE GYN. **XXVIII.** 201, Terrillon on; 321, Inflammation of tubes and ovaries.

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LANCET. **1886,** I. 213, The corpus luteum; 470, Ibid.

DUB. MED. JOUR. **LXXXII.** 146, Ovaries of a girl.

AMER. JOUR. OBS. **1888.** 558, Healthy and diseased.

ARCHIV F. GYN. **XXXI.** 327, Healthy and diseased.

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LANCET. **1887,** II. 117; 169, Case.

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ATLAS OF FEMALE PELVIC ANATOMY,

BY

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INCLUDING THAT OF

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REPRODUCED AD NATURAM.

BY

A. H. F. BARBOUR, M.A., B.Sc., M.D., F.R.C.P.E., F.R.S.E.,
Lecturer on Midwifery and Diseases of Women, School of Medicine, Edinburgh;
Assistant Physician for Diseases of Women to the Royal Infirmary; Assistant Physician
to the Royal Maternity Hospital; Physician to the Women's Dispensary;
Corresponding Fellow of the Royal Academy of Medicine, Turin.

PREFACE TO STUDENT'S EDITION.

Inasmuch as Anatomy furnishes the true basis of knowledge in Obstetrics, as in all departments of Medicine, I have in preparing another edition of this Atlas brought it out in a form which will place the results of the Sectional Anatomy of Labour within the reach of students.

Another plate has been added giving the most recent Sections, by Winter and Saexinger, which brings the series up to date.

EDINBURGH, *April* 1889.

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BY

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Corresponding Fellow of the Royal Academy of Medicine, Turin.

PREFACE.

The following pages were primarily intended as a Handbook to my Atlas of the Anatomy of Labour. They gather up, however, results obtained from study of all the sections hitherto published; and, to bring these within the reach of a larger number of readers, this little book has been made as far as possible complete in itself.

The book falls into two parts. The first of these gives, along with the description of my own sections, the general results, thrown into a connected form, of all the work that has been done in this department; while the second part gives the Literature of the subject arranged so as to exhibit in full detail the observations of others.

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